PACKAGE engineering

Principles of web-forming, tensioning

How to coordinate a continuously moving web with the intermittent stops and starts of package forming, filling, and sealing — and a look at the underlying engineering and mechanical factors. (See page 19)

New view of structural, functional design

Techniques of package development stressing new forms of interior protection — with special attention to producing and applying corrugated built-ups for peak package effectiveness. (See page 23)

Three keys to understanding polyethylene

Significance of (1) density, (2) melt index, and (3) molecular weight distribution in selecting and tailoring the functional properties of polyethylene to meet specific performance requirements. (See page 30)

Complete table of contents on page 2

JANUARY 1959

VOLUME 4 • NUMBER 1

BULK RATE
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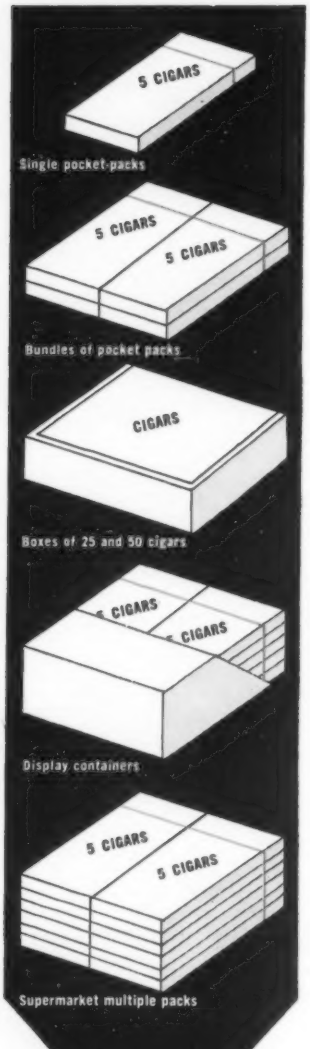
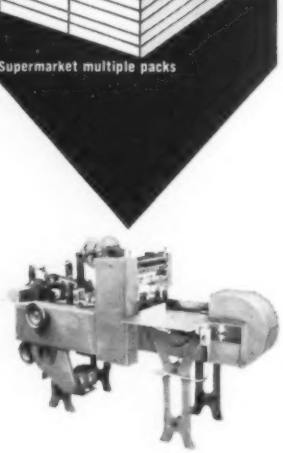
FOR HOLIDAY AND YEAR-ROUND PACKAGING IN '59 . . . SCANDIA'S VERSATILE MODEL "107", THE THREE-IN-ONE MACHINE THAT WRAPS, MULTIPLE-WRAPS AND BUNDLES





• Lets you eliminate costly display containers • Produces supermarket multiple-packs • Gives you Christmas and Father's Day packs with disposable overwraps • Provides economical bundles for rack jobbers. The cost-cutting triple function of the "107" helps you to profit from the latest merchandising trends accenting sales-promoting multiple wrapping or bundling. Can wrap multiples of packages unsupported by trays or sleeves...uses ingenious three-sides method of folding and sealing packaging material, producing stronger overwrap with fold-free visibility in top, front and bottom panels . . . overwraps all standard collations . . . uses minimum size sheet of material . . . turns out 40 to 60 small packages and 10 to 30 large packages per minute. PACKAGE RANGE: height ⅜" to 3¾", width 2" to 10", length 2" to 10", circumference 4½" to 19". ATTACHMENTS: opening-tape with extended tab, multiple and special magazines, automatic paper cut-out, printing and code-marking, conveyors and automatic intakes, electric-eye registration unit, special package discharge units. Consult Scandia's experts on how the 3-in-1 "107" can help you.

SCANDIA
PACKAGING MACHINERY COMPANY
NORTH ARLINGTON · NEW JERSEY · WYMAN 1-8400

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For more information circle No. 201 on Reader Service Card

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For your calendar

January 21-23. AMA Special Packaging Conference, Plastic Packaging Today, Hotel Biltmore, New York, New York. Contact: Mr. John L. Wood, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

February 20-23. 52nd Annual Exhibit of the Canning Machinery and Supplies Association, Conrad Hilton Hotel, Chicago. Contact: Mr. W. D. Lewis, Secretary-Treasurer, Canning Machinery & Supplies Association, 4630 Montgomery Avenue, Washington 14, D.C. *Telephone: Oliver 6-6979.*

February 21-24. 52nd Annual Convention of the National Canners Association, Conrad Hilton Hotel, Chicago. Contact: Mr. Nelson H. Budd, National Canners Association, 1133 20th Street, N.W., Washington 6, D. C. *Telephone: Executive 3-7030.*

March 31-April 1-2. Annual meeting of the Research & Development Associates, Statler Hotel, Washington, D.C. Contact: Col. Rohland A. Isker, secretary, Research & Development Associates, Food and Container Institute, 1819 W. Pershing Road, Chicago 9, Illinois. *Telephone: Lafayette 3-5500, Ext. 4262.*

April 13-15. AMA National Packaging Conference, Palmer House, Chicago. Contact: Mr. John L. Wood, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

April 13-17. 28th AMA National Packaging Show, Chicago International Amphitheatre, Chicago, Illinois. Contact: Mr. John L. Wood, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

May 17-21. Annual meeting of the Institute of Food Technologists, Bellevue-Stratford Hotel, Philadelphia, Pa. Contact: Col. C. S. Lawrence, Institute of Food Technologists, 176 West Adams Street, Chicago 3, Illinois. *Telephone: Andover 3-6268.*

November 16-18. 21st Annual National Packaging Forum of Packaging Institute, Hotel Statler, New York, N. Y. Contact: Mr. Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: Murray Hill 7-8875.*

Nov. 17-20. Packaging Machinery Manufacturers Institute Show, New York Coliseum, New York. Contact: Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: Atlantic 1-8552.*

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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Reader Service Card inside back cover

Our December 1959 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.

For more information circle No. 203 on Card

U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

JANUARY, 1959 U.S. INDUSTRIAL CHEMICALS CO., DIVISION OF NATIONAL DISTILLERS AND CHEMICAL CORP., 99 PARK AVE., N. Y. 16, N. Y.

Packaging Notes

Poly Cap for Lighter Fluid and Household Oil Cans features a valve spout that moves on an undercut track. The undercut design gives a tight seal which prevents both leakage and evaporation loss. The cap, which was developed after two years of testing, takes advantage of polyethylene's tendency to swell in contact with lighter fluid. The undercut valve component and undercut cap base both are designed to effect a tighter seal when swelling occurs. The caps are press-fitted to the cans with conventional polyethylene press-fit machinery.

Polyethylene gloves, strong enough to be reusable and inexpensive enough to be disposable, are now being marketed for both home and industrial use. The gloves are made of 1.75 mil polyethylene. Although strong, they do not impair the sense of touch as do gloves of other materials. They are presently being packaged in pocket packs of four and in economy rolls with up to 144 gloves on a roll. They are available in heavier gauges for industrial applications. The gloves reportedly have been cleared for use with radioactive materials by a leading radiation laboratory.

Gloves of 1.75 mil polyethylene are being packaged in economy rolls of up to 144 per roll and are available in heavier gauges for industrial applications.

"Woven" Polyethylene Bags for packaging citrus fruits and other produce may make their appearance soon. Poly strands are laid at intervals of about ⅜ths of an inch, then are heat-sealed to similar strands laid across them. The effect is an open, latticed material which has considerable strength. Decorative effects are obtained with strands of different colors.

Poly bag with two compartments separated by a simple polyethylene check valve permits dry premixes to be packaged in ready-to-use form. User simply adds liquid to upper compartment, squeezes it into premix compartment, then wet mixes the ingredients by kneading the bag. Check valve prevents leakage of contents. Products for which the newly patented package design is suggested include cake, pie crust and bread mixes, other wettable formulations such as glues, cements and plaster.

U.S.I. Holds Polyethylene Conference For Export Agents from Around the World

Discuss Latest Technical Developments, Growing Overseas Markets

Export agents representing 20 overseas markets were the guests of U.S.I. at a seven-day conference that included meetings in New York, Tuscola, Ill., and Chicago. Purpose of the conference was to review the latest developments in polyethylene technology and to discuss the rapidly growing markets for polyethylene abroad.

Export agents from 20 countries disembark from plane prior to visiting U.S.I. plant at Tuscola, Ill. for first-hand view of polyethylene resin production.

The 24 visitors represented markets which accounted for almost 75 percent of total U. S. polyethylene exports during the first six months of 1958. Represented were most of the European countries, South and Central America, the Far East, Near East and Mexico. Last year, U. S. polyethylene sales in these areas ran some 20% ahead of 1957, and further increases have been predicted.

After sales orientation meetings in New York, the conferees visited the giant petrochemical complex at Tuscola, where U.S.I. makes its PETROTHENE® polyethylene resins. U.S.I. research and production experts gave a series of lectures designed to bring the overseas visitors up to date on the latest developments in polyethylene resin production and processing.

The visitors moved on to Chicago for additional meetings and a press reception with editors of leading American plastics publications. The export representatives stayed on in Chicago to attend the National Plastics Exposition and the International Dinner of the Society of the Plastics Industry.

Poly Film Packaging Cuts Weight Losses in Peaches

Preliminary research conducted at a leading midwest agricultural experiment station indicates that prepackaging peaches in polyethylene film can cut weight losses in peaches which must be shipped over long distances.

In the tests, peaches were placed in plastic trays and overwrapped with perforated poly film. Weight losses during cold storage were reduced by 60%. Surface shriveling and dullness, usually encountered in bulk handling, were found to be eliminated in peaches which were packaged in film.

A controlled ripening schedule, in which the packaged peaches were ripened after a week in cold storage, was found to improve quality and reduce incidence of storage rots.

Borated Polyethylene: Order 6-8 Weeks in Advance of Use

Users of borated polyethylene are advised to schedule their orders six to eight weeks in advance of their projected use dates. The compounded resin picks up moisture from the air and must therefore be used within a short time after preparation. The six to eight week lead time on orders enables U.S.I. to schedule production for this specialized grade and insures delivery as close as possible to actual use date.

New Press Permits Printing Poly Film in Continuous Roll

A new printing press has been developed which enables polyethylene film to be printed in two colors at high speed without the need for stopping or reducing speed to join rolls.

Each reel stand of the new flexographic press carries two film reels, each independently driven. By synchronizing the speed of the full reel with the empty reel, the press permits a pasted joint to be made with no interruption or slow-down.

Speed of the press is said to be more than 450 feet per minute. The press is equipped with unit driers, a rotating mirror and web scanning device, static eliminator tension control and automatic paster on both unwind and rewind ends. The press will print two colors, with two more colors possible through the attachment of another unit.

A note from the Publisher

I noted recently that three leading food packers announced that they were not going to experiment any further on radiation preservation of food. After ten years of work, they did not feel they had made enough progress to make any further investment.

One of the company spokesmen commented that while the military had demonstrated by actual tests under controlled conditions that this type of preservation is feasible and is not harmful, they had a "captive" audience. Packers have to have a product that looks attractive enough for people to buy, and that tastes good enough to bring the buyers back for more. At the current stage of development, both taste and appearance are affected disadvantageously.

I visited the Quartermaster Food and Container Institute for the Armed Forces in Chicago not long after seeing this announcement and saw some of the things they are doing with food, and I think all of us — either as consumers or packagers — will profit by their experiments and accomplishments.

The military are continuing to work with suppliers and packers on radiation preservation, and I believe that ultimately they will come up with a flexible package that will not affect either the taste or appearance of the product using this type of preservation.

Another interesting development the Air Force has is vacuum packaged food in collapsible tubes. This was developed by American Can Company in cooperation with the Quartermaster to solve the problem of high altitude feeding. When the Quartermaster first proposed this type of package, it just didn't exist. Gerbers are now putting up a variety of food products for the Air Force in tubes, and this undoubtedly will help spread the use of this type of package in the food field.

The Army's current ration package is a modified "serve yourself" dinner. The corrugated outer package contains a packet of dehydrated food and a plastic pouch. Food and boiling water are mixed together in the pouch, using the outer box for support. The meat loaf they mixed up and served me was very good.

There are many other projects going on of great interest and importance to the whole packaging field. These projects range from experiments with cushioning materials for air drops to experimentation on types of packages suitable for use in space travel. If they come up with a package for space travel that not only protects the product, but is also edible and nourishing, they will have reached the ultimate in convenience packaging.

Many excellent packaging ideas come out of military experimentation. It's important to keep posted on what the military is doing, as some of their ideas may affect your own business.

Angus J. Ray

Publisher

PACKAGE engineering®

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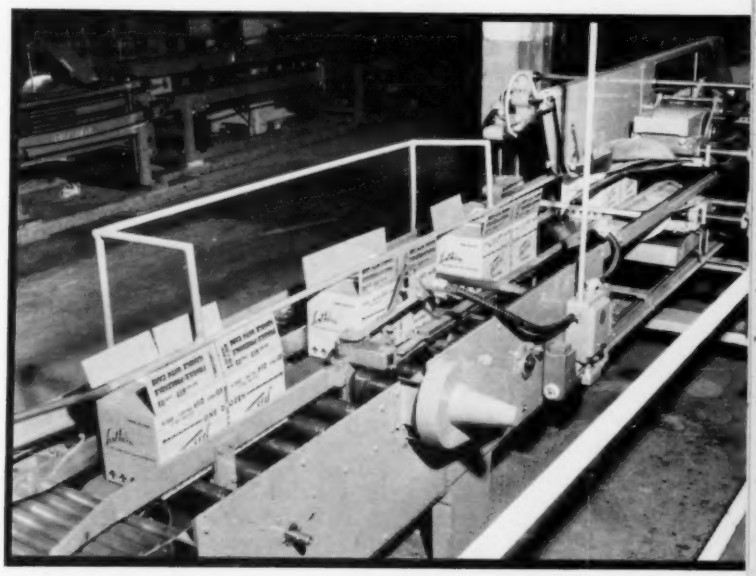
BPA

Helene Curtis Seals Glamour into *TWEED*... Packomatic® T.M. Reg. U. S. Pat. Off. Seals *TWEED* in a Unique New Shipper

Packomatic's Model D Case Sealer is here adapted to sealing the new Helene Curtis "split-case shipper". A simple retainer rail was added to a standard Model D Gluer to hold top inner flaps in correct glue position until case traveled under top spine of glue unit. The 24-bottle shipping case, consists of two independent (fully flapped) 12 bottle cases joined at their centers. The case snaps in two to permit filling a 12-bottle order, without breakage hazards present in removing 12 bottles from a standard 24 bottle case.

Packomatic Model "D" Case Sealers with compression unit are readily adaptable to meet a wide range of shipping case and production line requirements—case sizes, contents, glue requirements, speeds, and plant layout. Packomatic models available for top sealing only or top and bottom sealing—fully automatically or semi-automatically. Let us show you the great savings a Packomatic Model D can effect for you. WRITE FOR DESCRIPTIVE LITERATURE.



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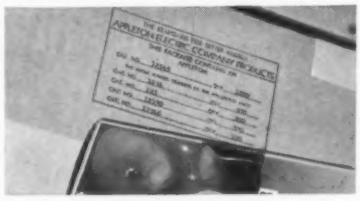

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Letters to PACKAGE engineering

Re: Job of packaging groups
Gentlemen:

Briefly we believe that Packaging Institute has been practicing the basic philosophy which your editorial recommends so strongly.

If you will recall you were invited to share the platform at the Special Technical Sessions in connection with the Packaging Machinery Manufacturers Institute Atlantic City Exposition in March of 1958, at which time the Packaging Institute invited the editors of Package Engineering, Modern Packaging, and Packaging Parade to share the speakers' platform and to express their uninhibited views for the first time from the same platform.

You will also recall that Packaging Institute invited Folding Paper Box Association of America, National Flexible Packaging Association, and National Paper Box Manufacturers Association to display their "prize winning packages" to the registrants attending our 20th Annual National Packaging Forum in Chicago this year.

We believe that we have consistently demonstrated the complete willingness of Packaging Institute to cooperate with other organizations which cover specialized areas of interest in packaging and believe that our efforts are beginning to bear fruit.

However, even as we call upon our "superb network of technical committees" (as you describe them) to constantly re-define their own objectives we appreciate the seriousness of purpose of your editorial and certainly look forward to much closer and more effective cooperation between the associations in the packaging field in the future.

C. W. Kaufman
President
Packaging Institute

Thank you, Mr. Kaufman. Wonder if other groups are as interested in cooperation as PI is? We hope so.

Re: Blister package specifications
Gentlemen:

I am particularly interested in specifications for blister packages at this time and would like to know if you plan to feature an article on this subject in the near future. I am thinking particularly of the establishment of standards and test methods for the degree of adherence of the heat sealed blister to the card.

If any of your readers have any information regarding this, I would certainly appreciate hearing from them.

William E. Grady
Quality Control Manager
The Carter's Ink Company
Cambridge, Massachusetts

Reader Grady will find pertinent articles during the coming year. Meanwhile, can anyone help him by furnishing spec's?

For more information circle No. 205 on Reader Service Card

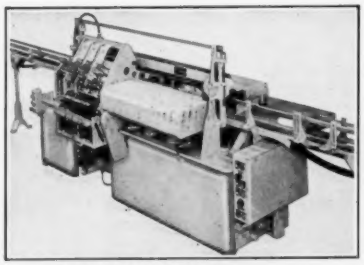
For more information write to manufacturer

What does it cost to label... LATER ?

Confusing ?.. not to a lot of food packers. At the peak of the season their production requirements far exceed the capacity of their labeling equipment. As a result they 'pack off' excess units in cases . . . send them to the warehouse.

Later, when things calm down, they retrieve these unlabeled containers from storage . . . uncase them . . . label each bottle . . . recase and ship. It all adds up to extra handling, *costly and unnecessary*.

If 'peak and valley' work loads are a challenge to your present labeling equipment, switch over to the World Super CM. This is a continuous motion machine which labels any ketchup container at speeds up to 210 bottles per minute. Ask your World Sales Engineer about the Super CM's "multi-label application," *too!*



SUPER CM LABELER

WORLD LABELERS

ECONOMIC MACHINERY COMPANY • WORCESTER 3, MASS. / Division of Geo. J. Meyer Manufacturing Company

The PULSE / of packaging

Packaging across the seas:

European Packaging Federation is expanding the work of its research and technical committee by inviting in all European independent packaging laboratories. This committee plans (1) conferences for research personnel, (2) standardization of testing instruments, and (3) more contact with international organizations involved in packaging . . . **Montecatini**, Italy's largest chemical combine, launched a 30 billion lira ($48,000,000) bond issue, for new and expanded plants including those for polypropylenes and other olefinic polymers. It will step up its Ferrara facilities to turn out from 20,000 to 30,000 tons of polypropylene annually . . . **Milprint Overseas Corp., S. A.**, subsidiary of **Milprint, Inc.**, is opening its first European branch office in Zurich, Switzerland.

Trends to watch:

Mobay Chemical Co. announces a new method of producing polyether urethane foam cushioning material, says it is a "one-shot" system that greatly simplifies the production cycle for converting basic urethane chemicals into commercial cushioning slab stock. Mobay says the new system permits increased control over such properties as tensile strength and softness of the polyether foam . . . **Package Research Laboratory** reports a trend to wirebound jackets for polyethylene carboys, since the ICC approved the wirebound container last year . . . **Forest Products Laboratory** continues to turn out research reports on packaging. Its report No. 2120 on cushion testing, "The FPL Dynamic Compression Testing Equipment for Testing Package Cushioning Materials," reviews its latest work in package cushioning, offers single copies free on request to the FPL at Madison, Wis. . . . Some existing pricing practices in the metal container industry have outlived their usefulness, according to **American Can Co.** It announces elimination of averaging can prices over broad geographic areas and plans a separate f.o.b. price at each plant for specific cans, thus resulting in reduced prices . . . We hear that machinery manufacturers expect more combination machines geared particularly to smaller companies seeking pre-coordinated machine combinations such as capper-labelers . . . **Collapsible Tube Manufacturers** say food industry executives show definite interest in foods such as spreads, mustard, jelly, toppings, and soup concentrates in fold-up metal tubes. Tube makers say food in tubes here lags behind Europe because of tubes being too closely linked with toothpaste . . . Around 4,000,000 lb. of reinforced plastics are going into containers and trays, according to the **Society of the Plastics Industry, Inc.**

Groups in the news:

American Society for Testing Materials reports that Committee F-2 on flexible barrier materials (one of its new committees) is making "encouraging" progress, with task forces developing test methods on composite and laminated materials used as flexible barriers. Subcommittees on specifications and on nomenclature and definitions also are at work . . . **National Safe Transit Committee**, established in 1948 by the **Porcelain Enamel Institute**, is now a separate independently operated corporation. This new group will carry on the activities of its predecessor, plans new and expanded services to manufacturers, container makers, testing laboratories, and carriers.

More expansion for packaging:

Crossett Paper Mills plans to step up capacity of its bleached food board mill by one-third with a $3,400,000 building program to start as soon as possible . . . **Cochran Foil Corp.**, subsidiary of the **Anaconda Co.**, announces a $2,000,000 expansion of its Louisville plants, mostly for two new "four-high" 62-in. foil rolling mills . . . **International Paper Co.** signed the first license to produce Clupak stretchable paper, plans to install equipment for it at its Camden, Ark., mill. **West Virginia Pulp & Paper Co.** also signed a license, has one unit running at Charleston, S.C., and another unit ready for installation . . . **J. M. Nash, Inc.**, Milwaukee specialty machinery maker, has acquired the **Bell Machine Co.**, Oshkosh, Wis., packaging machinery producer . . . **H. B. Fuller Co.** announces the start of production of industrial adhesives by its Canadian subsidiary, **H. B. Fuller Co., Ltd.**, at Winnipeg . . . **Polymer Industries, Inc.**, subsidiary of Philip Morris, Inc., plans to double its present manufacturing laboratory and office facilities at Springdale, Conn. This will give it 40,000 sq. ft. of space . . . **Olin Mathieson Chemical Corp.** expects to complete by mid-1959 its metallurgical research center at New Haven. This $4,000,000 facility will combine laboratories and an integrated pilot production plant . . . The newly established **Aero-Chem Laboratories, Inc.**, Bridgeport, Conn., aerosol packager, plans additional filling facilities, may add production involving nylon aerosol containers . . . **Revere Copper & Brass, Inc.**, has a new 30,000 sq. ft. foil container plant in Ft. Calhoun, Neb., near Omaha . . .

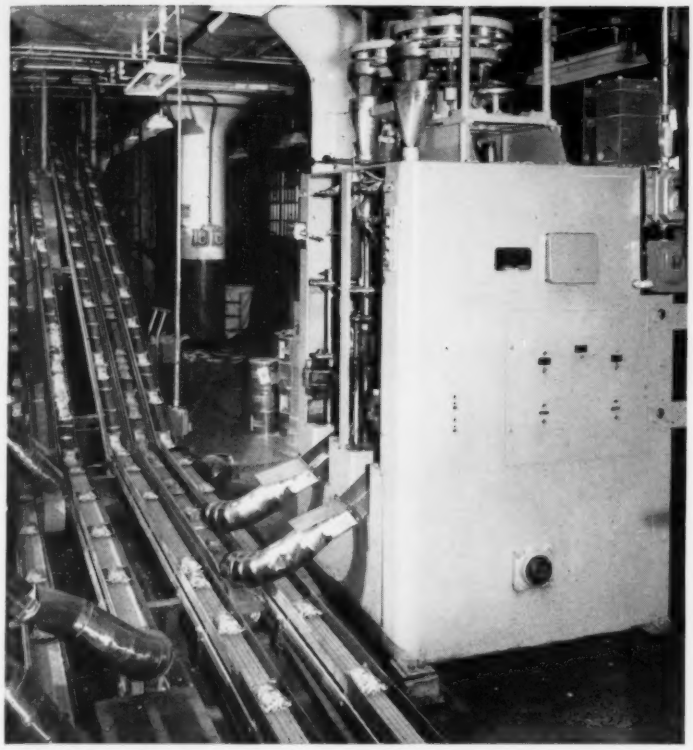
Packaging dollars and cents:

Olin Mathieson Chemical Corp. reports third quarter sales of $162,730,000, an increase of 10% over second quarter sales and a 2% increase over sales of $159,918,000 in the third quarter of 1957 . . . **Fort Wayne Corrugated Paper Co.** says the earnings of its third fiscal period resulted in net earnings of $667,165 for the first 40 weeks of this year. This compares to net earnings of $536,559 for the same period of 1957 . . . Fourth quarter earnings of $2,755,000 gave **West Virginia Pulp & Paper Co.** a net income of $9,575,000 for its fiscal 1958 (ended October 31). This compares with earnings of $12,694,000 for fiscal 1957. A late summer and fall upswing in the general economy sparked the improvement in fourth quarter earnings, the company says . . . **American Can Co.** reports third quarter sales and rentals of $325,947,808, compared to $308,091,126 for 1957, a gain of 5.8%.

What people are doing:

George W. Aljian is now vice-president of California and Hawaiian Sugar Refining Corp. . . . Johns-Manville, Dutch Brand Div., has named **C. Gregg Geiger** general sales manager . . . **Richard L. Siegel** has been named president of the Gardner Div. of Diamond Gardner Corp. **Colin Gardner** becomes chairman of the division . . . Plastic Papers, Inc., has named **Dr. William Mullen** director of production and research . . . **Robert C. Sargent** is now Eastern sales manager of Federal Paper Board Co., Inc., . . . New president of Nicolet Paper Corp. is **Arthur Snapper** . . . Crown Cork & Seal Co., Inc., has named **Edward J. McClure** director of purchasing . . . **R. E. Delaplane** is now general sales manager of Metro Glass Co., Inc. . . . Phillips Chemical Co. has named **G. F. Blinzler** Western district manager of Marlex sales, Pasadena, Calif. . . . **Joseph C. Tobin** is now assistant manager, advertising and sales promotion, Crown Zellerbach Corp.

(End)

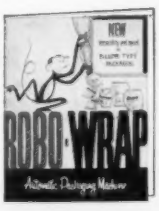


Why General Mills chose Robo-Wrap for Pick-A-Pack

This new Robo-Wrap at General Mills' Chicago plant will soon be joined by 2 more machines—because it has been proved that Robo-Wrap increases the efficiency and economy of their packaging operation.

The Robo-Wrap forms, fills and seals pillow packages. Under production line conditions at General Mills, the Robo-Wrap cruises at 100 bags a minute and can run at 120 . . . it provides a better seal and fewer rejects even at these high speeds because its unique hand-over-hand action holds jaws in sealing position for a longer time . . . it minimized work stoppages due to torn paper roll stock because the combination mechanical and hydraulic jaws exert a strong, jerk-free pull . . . it is easily adaptable to handle a variety of other products.

Robo-Wrap packages in cellophane, paper, poly, plastic or laminates. See how it can answer your needs for speed, dependability, easy maintenance and adaptability.



Write for illustrated Robo-Wrap Folder that demonstrates features and advantages important to you.

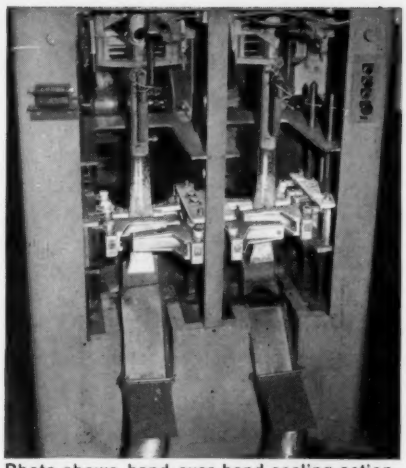
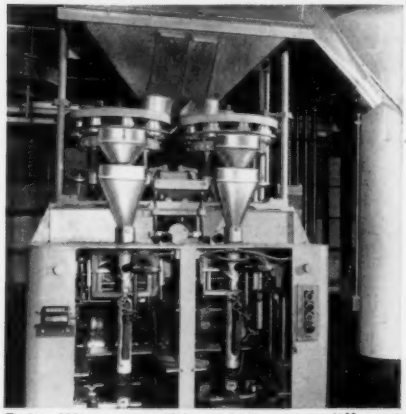


Photo shows hand-over-hand sealing action. Lower jaws, now disengaged, start to go up and pass on the outside of still-engaged pair of jaws.



Robo-Wrap versatility permits many different feeding arrangements. At General Mills, there is a volumetric feeder leading from storage hopper supplied from floor above.

General Mills Pick-A-Pack Package offers five tasty breakfast foods—Wheaties, Cheerios, Kix, Trix, and Sugar Jets—in one attractive carton.

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Dobeckmun's most revolutionary ideas in packaging were originated to solve individual marketing problems. For example, Durafilm Pouches were developed to reduce the marketing costs of big volume items. Being ready-made, pouches of transparent Dobeckmun Durafilm eliminate a costly and time-consuming step in the selling of products pre-packaged for self-service. Long-lasting protection, eye appeal, ready identification of your brand are advantages you can always afford at Dobeckmun where *your* costs are always *our* consideration. The packaging you are looking for may not exist today, but it will tomorrow—when you put Dobeckmun to work.

Customers recognize at once the quality of attractive, appetizing Swift processed meats *vacuum-packed* in Dobeckmun Durafilm Pouches. Rugged, long-lasting protection and ease of filling have made Durafilm Pouches the preferred packaging medium for 14 products of Swift & Company.

DOBECKMUN

Dobeckmun Durafilm Pouches help processed foods preserve a tempting fresh-sliced look. Perfectly transparent Durafilm leaves nothing to the imagination of the customer. Today's mass marketing compels you to offer your goods in packages that sustain the old-fashioned intimacy between the customer and her purchase. Whatever your product, it will look better and sell better at lower cost to you in packages for performance by The Dobeckmun Company.

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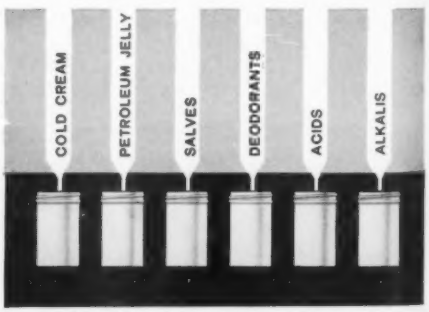
CELANESE FORTIFLEX MAKES POSSIBLE A

A Word About Celanese Fortiflex . . .

Fortiflex is a linear type polyolefin with a specific gravity less than water. Its rigidity combined with toughness makes possible a host of packaging applications—from thinwall blown bottles and injection molded jars to transparent film for bags and wraps. Its heat resistance and resistance to chemical attack mean that Fortiflex containers can be subjected to post-packaging sterilization, and can be used for packaging many chemically reactive liquids, semi-solids and solids. Fortiflex has the sanction of the Food and Drug Administration.

If you have a packaging problem that calls for something special in a packaging material, write to: Celanese Corporation of America, Plastics Division, Dept. 105-A 744 Broad Street, Newark 2, N. J. Canadian Affiliate: Canadian Chemical Co., Limited, Montreal, Toronto, Vancouver. Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.

Celanese® Fortiflex®



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Celanese Fortiflex is basically a simple polymer of ethylene. However, its ordered molecular arrangement provides the combination of rigidity, toughness, and chemical and heat resistance needed for almost any type of container packaging.

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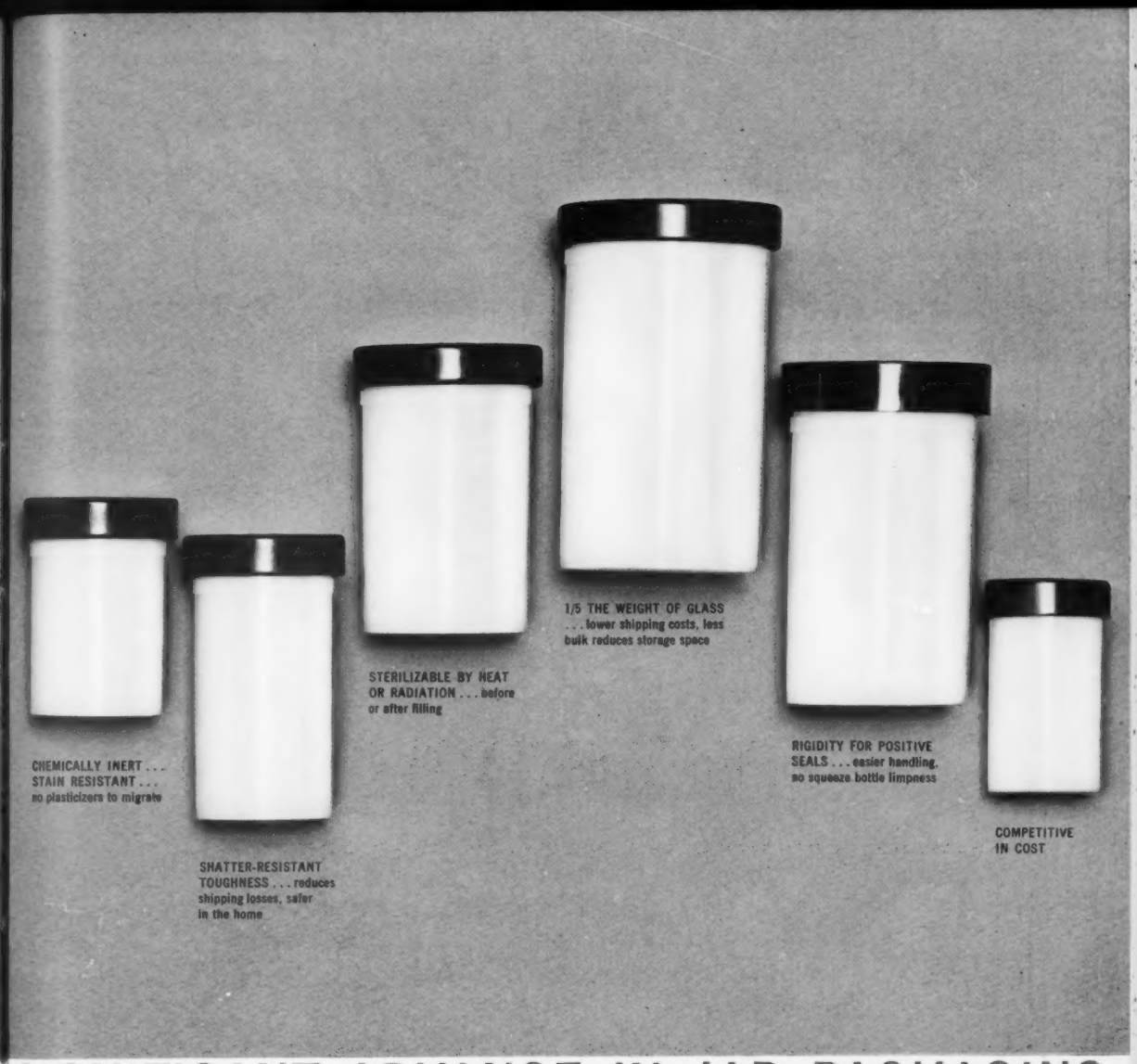

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Fortiflex...a Celanese linear polyolefin

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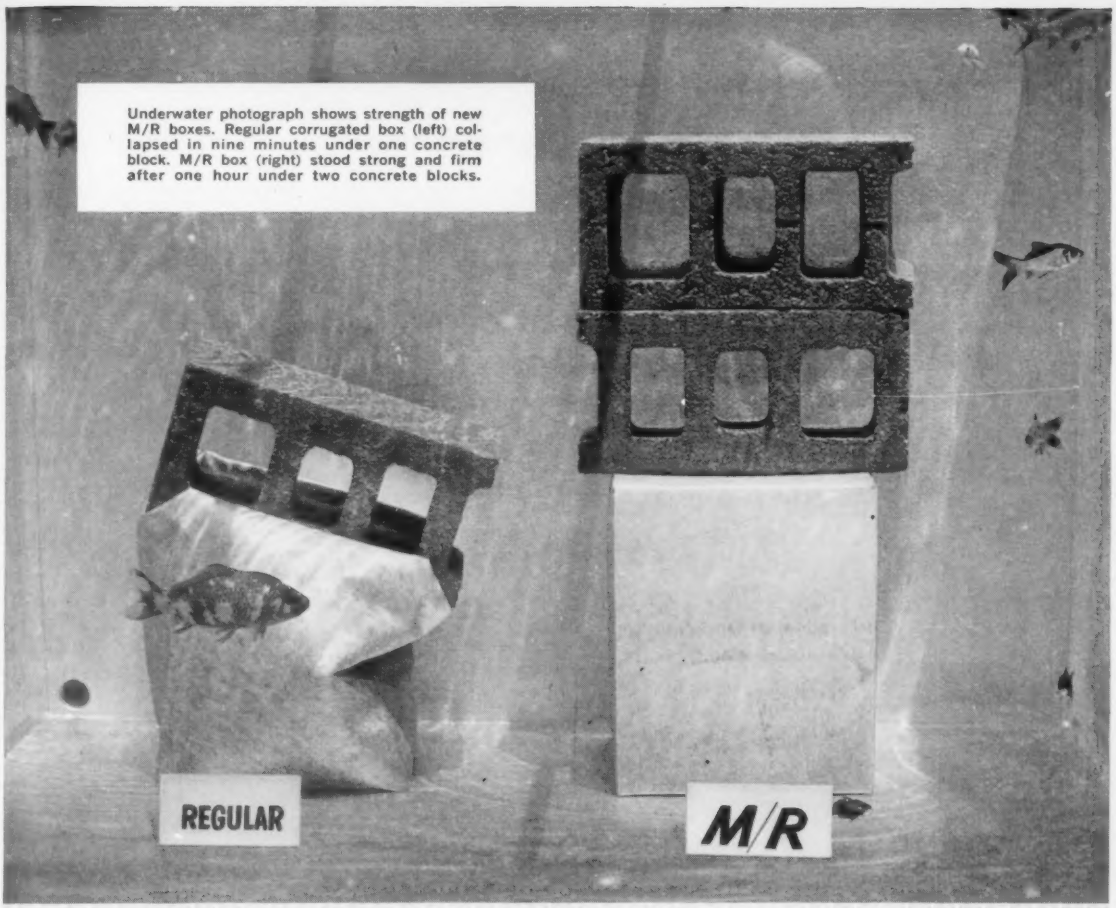

Underwater photograph shows strength of new M/R boxes. Regular corrugated box (left) collapsed in nine minutes under one concrete block. M/R box (right) stood strong and firm after one hour under two concrete blocks.

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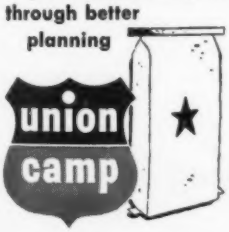

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YOU CAN DEPEND ON DOW

Here is an expert's eye view of intricacies involved in coordinating a continuously moving web and the intermittent stop-and-start functioning of package forming, filling, and sealing. Mr. Canfield stresses fundamental principles involved, problems of keeping a web moving, fine points of plow geometry, and the all-important function of a dancer roll.

Basic principles explain web forming and tensioning

By Allen B. Canfield,
Chief Products Engineer,
Bartelt Engineering Company,
Rockford, Illinois

A common requirement for packaging machinery is the transferring of the web from the roll stock through the machine in such a manner as to fabricate pouches of a specified size—and to make these pouches consecutively. We are focusing this discussion on the principles by which this is done *intermittently* while handling relatively rigid webs, for example, laminations such as foil combinations, papers, and films, as may be furnished by a converter to a package user.

In general, there are two types of machines to perform this function: vertical and horizontal. However, basic principles are the same for both types. Therefore, we are confining this discussion to the horizontal type of machine.

Fundamental principles of mechanics underlie the problem involved here. A basic guidepost is to start the roll in motion and use a flexible device or means by which to take up the slack due to the changing speeds inherent in the intermittent motion—and yet keep the roll moving without stopping. The goal is to have a constantly moving roll of stock that does not stop—even though the package forming action requires a stationary period or dwell time.

For complete understanding, it is necessary to realize the mechanical principle involved. **The differential between the rolling friction of the maximum diameter of any roll from the outside of the roll down to the core is considerably less than the static friction differential between the maximum diameter roll and its core.** This refers to the difference between a full roll and a core or a butt roll.

Further, the distinction arises in two ways: (1) When the roll is in motion, and (2) when it is stopped. It takes more force to get it started again than when it is a roll of smaller diameter, such as when the full roll is reduced to near the diameter of the core.

We are faced with two conditions: (1) That of starting and stopping the roll intermittently as it progresses from the maximum di-

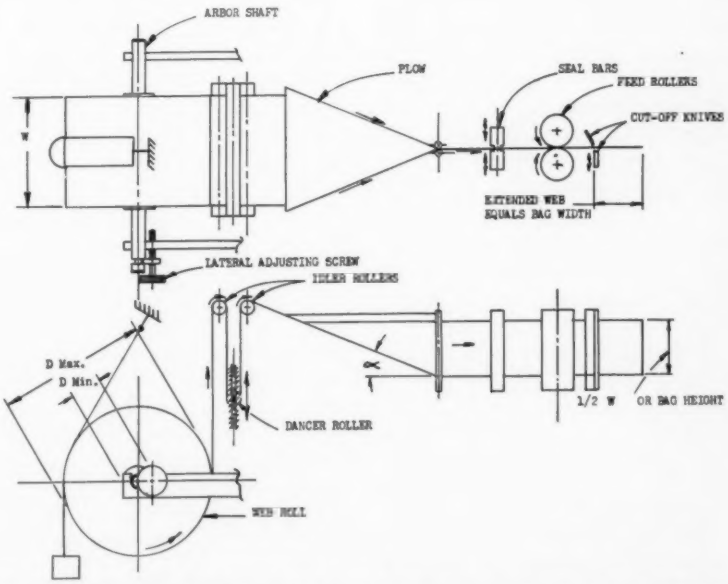

Fig. 1. As roll stock feeds (left to right) through forming and sealing units, it is intermittently pulled through — a distance the width of one bag at one time. Note arrangement of dancer and idler rollers and compensating action of dancer.

Allen B. Canfield is a graduate of Texas A&M College with a B.S. degree in aeronautical engineering. Following his military service and prior to joining Bartelt, he was associated with Consolidated-Vultee Corporation, Ogden Engineering Company, and Ipsen Industries. Since joining Bartelt five years ago, he has been engaged in the design and management of packaging machinery development and engineering. Mr. Canfield is a member of the American Society of Tool Engineers.

ameter to its core, and (2) maintaining the roll in motion at all times at a varying rate of speed (but nevertheless in motion) from maximum diameter to core. The differential from the maximum diameter to the core under condition (1) above is considerably greater than in condition (2).

Object: Keep The Roll Moving

The underlying object is to keep the roll moving at all times, since it is impractical to stop and start a roll and still maintain a production line speed. If this is done, there would be many variances or inconsistencies due to the intermittent feeding of material, as set for a given bag width.

Web Feed

At the web feed end of the machine, the application of power from the equipment applied to the web pulls it and in effect strips it from the web roll. From this point the web passes through the dancer roll over the plow, past the sealing bars, and then extends or moves past the cut-off knife, a distance the width of one bag. (See Fig. 1) This movement is generally accomplished in one-half the cycle of the machine. This allows the second half of the cycle to perform various functions on the web. Most important of these is the heat sealing action. In any of these actions, it is necessary that the movement of stock through the machine take place very smoothly.

When the speed change from complete stop to maximum speed is too abrupt and not properly compensated for by the dancer roll and the web roll arbor brake, the following happens:

The web roll will run free during the idle period. This means there is a loss of control of the web. Therefore, to attain the desirable smooth motion, there must be some form of mechanical motion applied, such as an adjustable crank. This may be attached through a linkage to either an oscillating arm or a rack and pinion. (See Figs. 2 and 3)

The motion here transmitted to the web is very nearly the vertical movement of the loci of a point traveling around the circumference of a circle, or simple harmonic motion. The characteristics of this motion are well suited to the function on packaging machinery, and can be used for speeds in excess of 200 intermittent cycles/min.

Problems With Printed Web

Special considerations arise when using this motion while running printed web. The distance of travel has to be set slightly more than (plus 1/64 to 1/32 in.) the width of the bag. This compensates for the variations in printing. As the register mark is reached and is sensed by the electric eye of the scanning head, an electric brake is applied to the feed roll drive shaft. This stops the travel short of the mechanical setting, but in a correct location for the printed web.

This is accomplished by actually braking the feed roll drive shaft to a stop short of its full mechanical travel through the actuation of an electric brake mounted on the feed roll drive shaft as sensed by the electric eye. To allow for the braking of this mechanically powered shaft, one member of the power train must be made flexible. Unless this is provided, the mechanism will not operate as planned.

Effect Of Variation

The basic reason underlying the use of this compensating device and action is that, even if the printing could be done perfectly, it would be impossible to set the

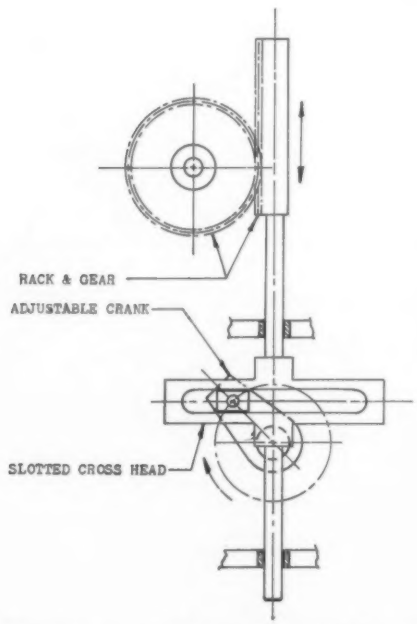

Fig. 2. Some form of mechanical motion (such as an adjustable crank) is necessary to assure smooth motion and to avoid loss of control of web. Reason for this is that web roll runs free during idle period of machine action.

feed with sufficient precision to match the printing. In actual practice, the printing is never perfect since unavoidable variations in the printing process (as in all mechanical actions) are present.

It is important to note the effect of the small variation over the cumulative distance traveled by stock in producing a large number of packages. For example, if the feed could be set at 0.001 in. in deviation of the prescribed dimensions, and if the machine cycles at the rate of 60 cycles/min., the registration would be off 3.6 in., after just one hour of operation.

Only 180° of the crank arm rotation are used for the web movement or the power portion of the cycle. The other 180° of the cycle are its idle portion. The use of just one-half of the cycle in this way is accomplished by the oscillating arm being attached to a one-way clutch. As a result, the roller drive shaft through these units turns in one direction only.

Using A Drag Brake

A drag brake is applied to this shaft, preventing any backward movement in the event the one-way clutch requires any force to break it loose for the reverse stroke. It also serves to counteract any reverse loading applied by the web. The net effect is that this brake also tends to stabilize the intermittent motion.

If a drag brake is not desirable, an electric brake can be used as an alternative. By proper timing, the brake can be applied during the idle period and released for the power stroke.

The crank arm is the simplest, most effective way of applying intermittent motion for such an application; it can be made adjustable for various amounts of movement. It also derives a desirable motion at a low cost.

Web Forming

When speaking of "web forming," reference is made to the device used to form or fold the web as it comes from the roll stock. In other words, the material leaving the roll is a flat sheet and must be formed or folded into the desired configuration to make the pouch.

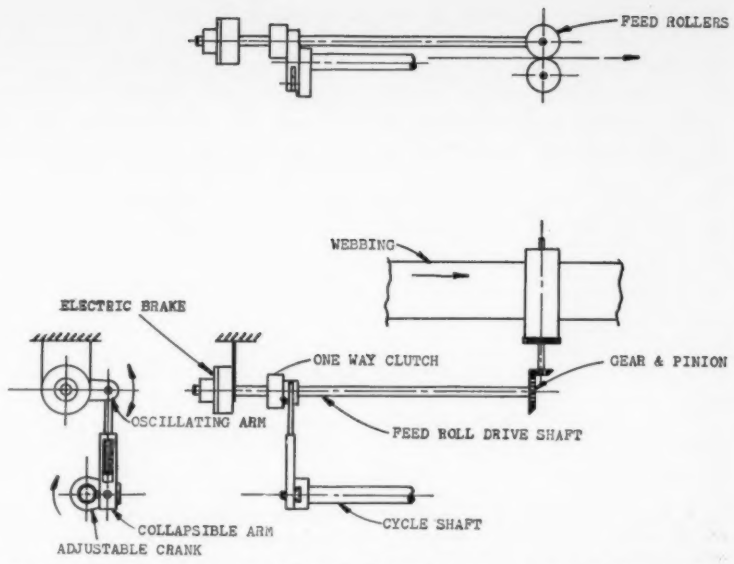

Fig. 3. Oscillating arm or rack and pinion provide possible means of attaching (through a linkage) mechanical action such as adjustable crank, contributing to control of web during idle period.

There are many devices for doing this and variance in design is great. **However, the basic principle involved is that whatever device or technique is used, it must fit the flow of the web.**

We emphasize that no matter which way the web is folded or how the direction of flow is changed, there must be no slack places or wrinkles. If these occur in the course of this action, there will be either tearing or a loss of control of the web.

An example of a basic principle in package forming is the common V-type plow. (See Fig. 4) This plow is made from a piece of sheet metal and folded as shown by the fold lines in this illustration. Since the web from the roll stock is inherently the same flat shape as the sheet metal, it can be folded in just the same way. As a result, the geometry of the plow now fits the requirements explained above.

Watch Plow Geometry

Correct geometry of the plow allows smooth motion of the web thru the machine and will produce wrinkle-free and crisper-appearing bags. Also, with the web flowing smoothly without wrinkles, a more accurate bag width will be held and the machine will be capable of greater speeds and fewer operation problems.

In other words, there will be no unnecessary disturbing conditions injected into the web feed that can cause trouble both at the feed rolls and at the web tensioning end of the machine.

Length *L* can be determined by the space limitations or designed as desired into the machine originally. If a rectangular piece of sheet metal is used and folded as shown, all proportions will be correct. This can be checked by folding any rectangular piece of paper and observing it closely. The paper folded as is shown is proof that this is the way that the webbing will act when pulled thru the machine and folded. The sharper the corners of the folded edges, the better the flow will be.

When the plow is fabricated from flat stock, the same basic geometry must be followed: The angle is the angle at the center line. The two angles on either side of the plow when taken in the top

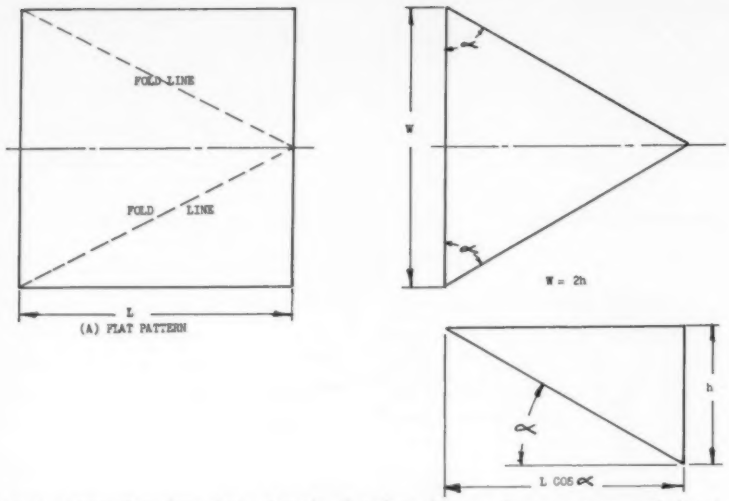

Fig. 4. V-type plow shows basic principle of package forming. Correct geometry of plow is vital to formation of wrinkle-free packaging. Forming of package must coordinate with flow of web.

plane will be the same as α. The folded edges of the plow will be placed in a horizontal plane with the length L of the original sheet at the slope shown, thus the true length of the plow becomes $L \cos \alpha$ as shown in Fig. 4.

Web Tensioning

The web tensioning mechanism is that portion of the machine that controls the web and the web roll. This allows the web to be fed from the web roll with smoothness and with the proper amount of tension.

By proper amount of tension, we mean that which is required to hold the web taut through the machine, thus forming the web properly without distortion. **When the tension is too great, the web will be distorted or torn; if too loose, the web will become slack and fall away from its guiding.** There is a wide range that is satisfactory for operation and is generally determined by the web itself and the devices through which it flows.

To accomplish this, the web roll is mounted on an arbor shaft and placed in half journal bearing. The journal is the arbor shaft. The reason for the half bearing is the ease of roll change. All this is mounted with an adjustable brake applied to retard the motion of the roll. (See Fig. 5)

Two Design Principles

This prevents the web roll from running free during the dwell part of the web feed cycle. As a means of softening the intermittent movement of the web feed, there is a dancer roll. There are two principles by which the dancer roll movement can be designed:

(1) As shown in Fig. 5, **the dancer roll pivots are moving vertically and the web feed begins.** This releases the web arbor brake and in turn allows the web roll to roll freely. This movement is maintained during the web movement with the dancer roll rising during the first half of the web movement.

It then begins to lower during the last half of the web movement as the speed of the web drops again to zero. As this takes place, the web arbor brake is applied and stops the web roll. This method is applicable to machines operating around 60 cycles/min. In excess of 60 cycles/min., the maximum figure varies according to bag size, and the brake does not stop the roll at the instant the brake is applied.

Since it does not stop the roll at this moment, the effect is that the web roll continues to overfeed the limit of the dancer roll movement. As a result, there is slackness in the web. This, in turn, causes an abrupt movement of the dancer roll and makes it inopera-

(*Continued on Page 62*)

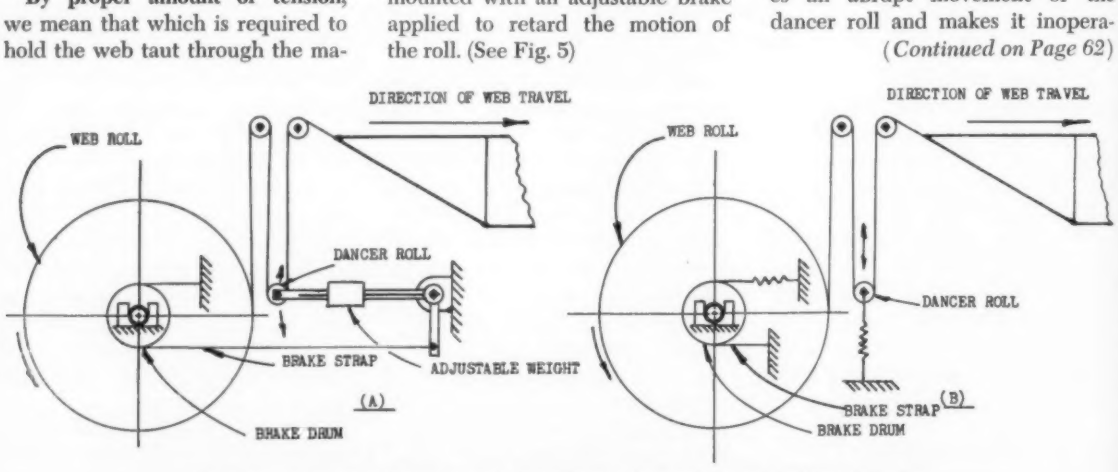

Fig. 5. Proper amount of tension on web is necessary to form web properly without distortion. Two methods of using dancer roll to assure correct tension are shown above. In (A) the dancer roll pivots move vertically. In (B) dancer roll travels vertically against tension of spring — as web feed begins. Purpose of both methods is to keep excessive tension from distorting or tearing web and prevent inadequate tension from causing loose or slack web.

Application of basic packaging principles to specific products often demands new concepts of structural and functional design. In reviewing his company's development and use of such principles, Mr. Renner tells how corrugated built-ups became a major method of protecting television sets within their packages. His discussion of these and other packaging components and his critique of television packaging as it has changed during recent years should prove useful to others seeking to take the guesswork out of packaging decisions when developing improved functional designs.

New approaches to structural and functional package design

By John S. Renner,
Packaging Engineer,
Admiral Corporation,
Chicago

Changes in the packaging of television sets in recent years have been just as dynamic as changes in the field of package engineering generally. The refinement and upgrading of the know-how and know-why of packaging exert a profound influence on those who make packaging decisions.

The packaging experience and development of our own organization has crystallized into a collection of packaging principles. In turn, we have translated these into more or less definite techniques of performing the specific packaging function.

We insist on realistic, rather than excessive, packaging. Our package must get the TV set intact to the end user—but no further. Therefore, we provide only that protection around the product deemed necessary to protect it against normal handling, warehousing, and shipping hazards. There is no positive formula by which to determine the precise amount of protective features the package must have and the exact cost of the package.

Proper cost of a package is not necessarily figured as a percentage of the selling price of the item. Rather, it is the lowest cost necessary to meet all necessary requirements. However, if a proper package seems too expensive in relation to product value, calculated marginal packaging might merit consideration. A minimum protection design might do the job. But a word of warning to anyone contemplating this procedure: One *damaged* article creates a lot of ill-will and somebody pays for every damaged product. *Calculated* marginal packaging is a *calculated* risk. (*Turn Page*)

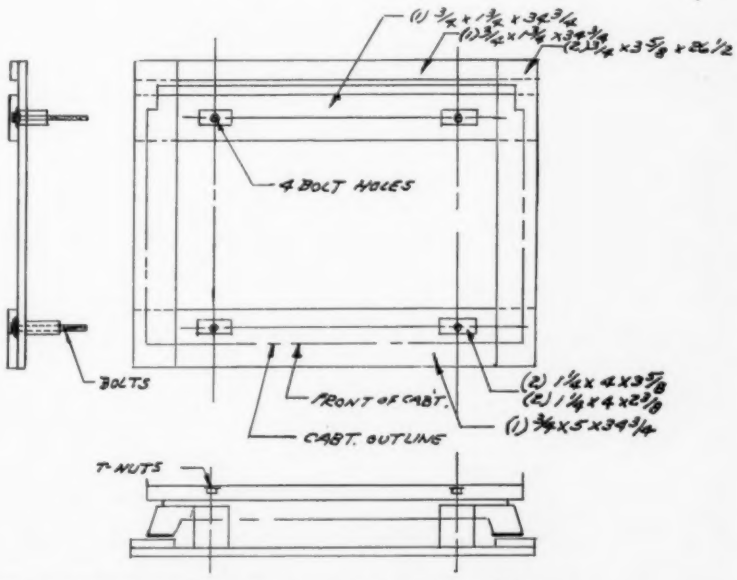

Fig. 1. Old method: Mounting heavy wood frame or skid to cabinet.

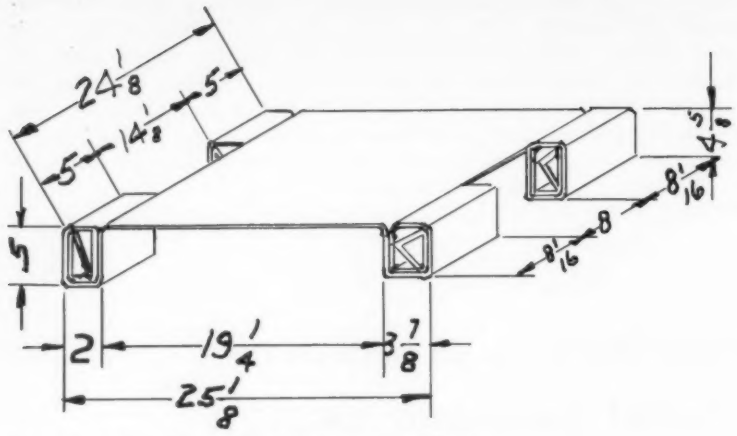

Fig. 2. Scored corrugated sheets fill space in top of package.

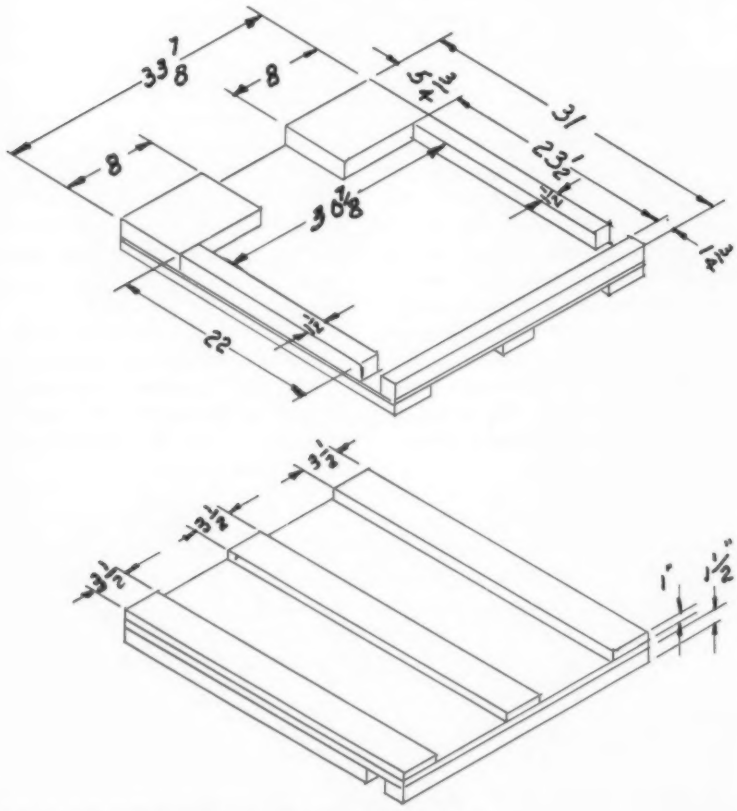

Fig. 3. Early built-up packaging forms reveal elemental design.

The engineer designing a package must apply all his knowledge and experience to its structural and functional design. He must consider product cost, quantity to be produced, product fragility, packaging labor, handling and warehousing, shipment methods, structural and functional design features, component package materials, and the costs of all these.

Use Pre-Shipment Tests

Pre-shipment tests of packaged products represent an important phase of our package design program. Before we adopt a new package, we sample and test it according to National Safe Transit Committee requirements. We often subject these packages to more severe tests than these to determine the margin of safety in the package. Over-testing often helps us spot weak points in the product as well as in the package. Frequently the product itself requires alteration or strengthening in order to ship it without requiring excessive packaging.

After we correct the weak spots in our package or product, we get new samples and make final tests. Once the laboratory testing is completed to our engineers' satisfaction, a quantity of 1,000 to 5,000 of the new package is released for production. We next make a careful study of our package in actual performance starting with a shipment of empty cabinets from the cabinet manufacturer.

We then trace it through our own assembly operation where each television chassis is installed. Then we follow the package through warehouse, rail-car or motor-truck loading, and into shipment. We check further upon arrival of the new packages at some of our distributing points. We ask our distributing companies to make out inspection reports and send them to us for study.

Our packaging efforts now start in earnest. We go over the new package with utmost criticism and look for places where we can improve its performance and cut its costs. Before one TV set replaces another, we sometimes drastically alter our packaging. Nine times out of ten, our final costs are down. We make a distinct saving due to the second or third look at our package design. While we always strive to cut packaging costs, we also want reasonable assurance that product damage will stay at a negligible figure.

Heavy Skids Once Used

Changes our packaging has undergone since 1950 illustrate the application and refinement of our

techniques. At that time, our cabinets were 100 per cent wood-skidded. The universal method of packaging television consoles then was to mount a heavy wood frame or skid to the cabinets. (See Fig. 1.) This practice no doubt started in the plant manufacturing the cabinets in order to have a pallet on which to ride these cabinets on a roller conveyor while assembling and finishing them.

Normally, these skids were of four- or five-piece construction, using 1-in. standard lumber dressed to a thickness of ⅝ to ¾ in., or left rough with a ⅞- to 1-in. thickness. Cabinets of the style seen in Fig. 1 were often elevated or floated from the framing by means of four wood blocks. These kept the cabinet itself off the skid. Purpose of this was to protect the legs; they were vulnerable to splitting if put directly on the skid.

At the same time, we thought these wood skids did a good job. By today's standards, they are too costly. In order to use a skid of this type, it is necessary to build more strength into the cabinets than is needed after the cabinet is delivered to a customer. Cost of wood, nuts, bolts, washers, and assembly labor represents a lot of unnecessary expense. Our leg-style cabinets are now packaged in a corrugated design of one type or other.

Since wood skids were usually made of runners and deckboards, they were normally a minimum of 1-½ in. thick below the cabinet. As 1-in. clearance under a TV set is necessary for rail and truck shipments, the wood skids wasted at least ½ in. of box height for every unit shipped.

In connection with these skids, cabinets were held at the top by means of two scored corrugated sheets whose corrugations ran perpendicular to one another. (See Fig. 2.) The part shown is one of the details used to pack a console television set as of 1950. To pick up the required ½ in. over the cabinet, we put a plain pad over the scored sheets—which were of A- or C-flute construction.

Switch To Corrugated

In 1951 we made a conversion to all-corrugated packaging. During this year, we made the transition from wood skids to corrugated board on the bottoms of our cabinets. Because of the 1-in. clearance requirement, we used three scored,

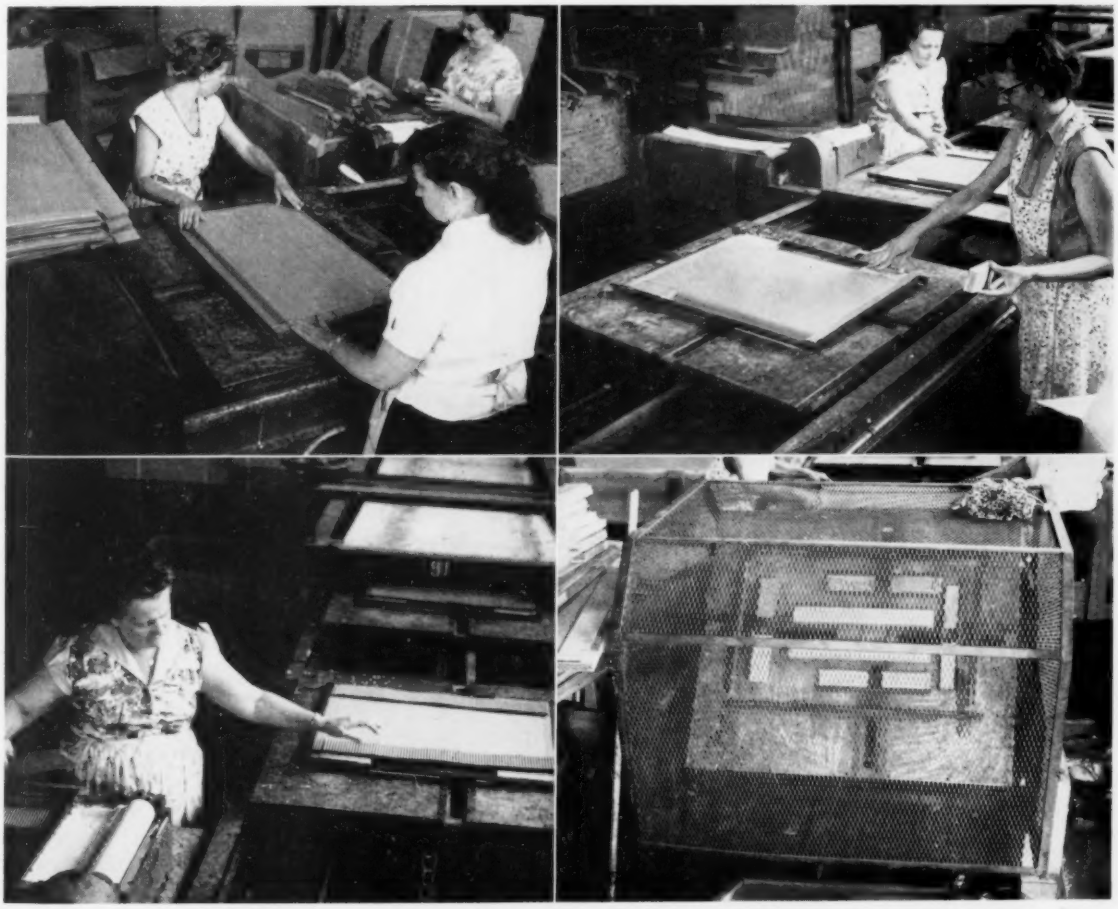

Fig. 4. Photos 1 (upper left), 2 (upper right), and 3 (lower left) show semi-automatic production of built-ups: Forming sheet; positioning primary built-up blocks; positioning secondary or runner blocks. Photo 4 (lower right): Mechanically applying pressure to laminated runners to die-cut sheet.

John S. Renner is a graduate of Crane College, having majored in accounting. He has had further training from Walton School of Commerce and Illinois Institute of Technology. Mr. Renner has spent more than 15 years in packaging and handling in the electronics, television, radio, and major appliance fields. He is a member of Society of Packaging and Handling Engineers.

A- or C-flute, double-faced corrugated sheets. Three reasons prompted our making this change:

(1) A change to corrugated bracing meant reductions in cabinet costs by cutting the width and thickness of framing members. We also gained a reduction of cabinet weight.

(2) We anticipated a lower cabinet damage ratio in shipping. At that time it was a serious problem. Now it is negligible.

(3) We thought corrugated packaging would cost less generally because box height could be reduced, etc. At today's prices, corrugated board is less expensive to use in packing the leg-model cabinets than wood skids plus hardware, plus labor, etc.

Even though we made a successful transition to all-corrugated, we still thought there was room for improvement. We sought some reduction of the time required in hand folding and taping, or stitching the scored sheets.

Also, we questioned their application or utility where large clearances of 4 to 6 in. must be bridged and where cut-outs in the rolled-up area were necessary because of knobs, antennas, or controls protruding from the surface of a cabinet. We wanted to speed up packing time on the assembly line both at the cabinet manufacturing plant and during the unpacking and re-packing operation in our chassis installation plant.

Why Not Corrugated Built-Ups?

Corrugated built-ups were introduced in 1952. That year marked our transition to fixed corrugated packing forms. Initially we used built-up corrugated blocks glued to a base sheet of 200-lb.-test, double-faced material. (See Fig. 3.) Built-up packaging impressed us as the answer to our problem. Here was a packaging item ready to use, not needing any folding, stapling, or taping. All that appeared necessary was to position it, close and secure the box, and ship the package.

To compare these built-ups with scored sheets, we made many tests in Chicago. We subjected conventional scored sheet packaging and built-up block packaging to identical impacts. Impact recorders mounted inside the TV sets invariably showed similar results with the two types of interior packaging.

Chief problems we encountered with built-up packaging forms (see Fig. 3) were delamination of the built-up plies, poor adhesion in the single-faced stock, poor adhesion in the blocks to the base sheet, and poor holding of dimensions. We have since made many improvements on all these points.

In laminating sheets of single-faced board, a viscometer now proves helpful in assuring proper consistency of the adhesive. A doctor roll on the laminating machine helps get uniformity of adhesive application. Methods of carrying the single-faced material through the laminating machine have been revised to insure uniform speed and pressure.

Dextrin and resin adhesives are commonly used in securing the built-up pads or blocks to the corrugated sheet. We have learned that the type of adhesive used must coordinate with the application. Important considerations are: (1) Humidity of the atmosphere and moisture content of the paper; (2) temperature of the adhesive at time of application, degree of adhesive spread, and amount of pressure at time of application and before adhesive sets, and (3) proper bundling of finished forms.

We found that applying weight to the master built-up block helps insure penetration of adhesive into

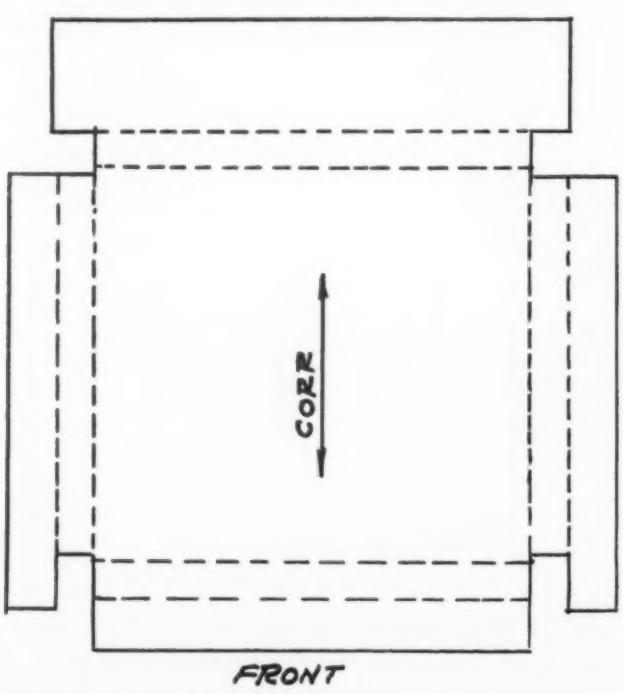

Fig. 3. Die-cut blank from which form is made. Dotted lines are perforated scores.

the fibres of the single-faced material. Further, this material must be of proper fibre consistency, moisture content, and good cutting quality to insure a strong, clean, inexpensive built-up block.

Producing New Forms

From 1953 to 1955 was another period of experimentation. Of many ideas developed, one proved to be an answer to our problems of built-up or fixed-form interior. Photos 1 through 4 (see Fig. 4) demonstrate the semi-automatic production of built-ups developed by our company in conjunction with our corrugated box suppliers. Fig. 5 shows the die-cut blank of 125-lb.-test, B-flute corrugated board from which the form is made. The board is cut and scored to allow easy forming. The low test of the board reduces resistance to bending. The blank is of minimum size.

The five steps in producing the form are: (1) Forming the die-cut sheet over an adjustable fixture; (2) positioning the primary built-up blocks after they have been run over the adhesive roller; (3) positioning the secondary or runner blocks; (4) uncocking the spring activations to afford the necessary pressure needed to laminate the sides of the blocks to the vertical walls of the formed die-cut sheet, and (5) application of pressure (see photo 4) to laminate the runners to the die-cut sheet. This latter step is mechanical, as is step No. 4.

Fig. 6 shows two more forms developed with our corrugated suppliers to meet our demands for a fixed detail for the tops of our cabinets. Detail No. 1 is made from a die-cut base sheet of 125-lb.-test, C-flute corrugated board and is hand formed. At the ends of the rolled sections there are tabs which fit into slots of the sheet. No adhesive is required to hold the built-up blocks which are placed inside the end rolls; thus, the tabs bind the assembly together. Detail No. 2 is produced from two basic die-cut, wrapped-and-glued built-up

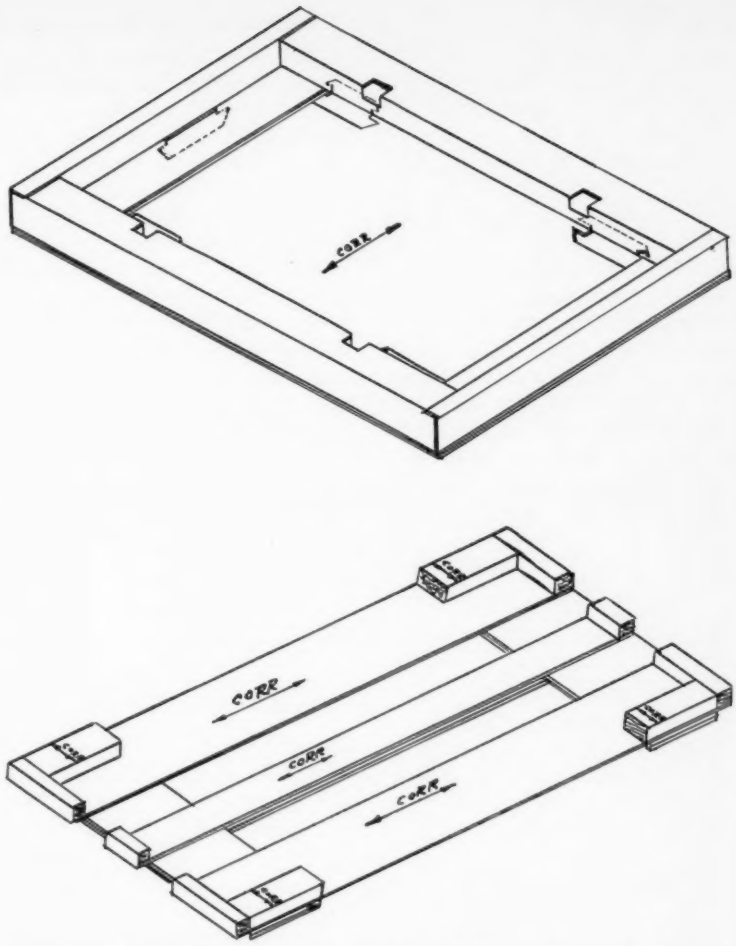

Fig. 6. Detail 1 (at top): Die-cut interlocking form. Detail 2 (at bottom): Wrapped built-up form made from two basic die-cut wrapped, glued built-up forms.

forms which are made in large 48-in. wide sections. These sections are then sliced down to the widths required for the particular top form being made. Pieces from one section go lengthwise over the cabinet and those of the secondary section fit front to rear. The three length and two width strips are glued to each other to set the inside and outside dimensions for perfect fitting over the cabinet. Advantages of these styles of interior packing are similar to those of the former type.

Introduce Corrugated Skids

During 1956 and 1957, we converted to corrugated skids. Although the wood skid was discarded several years earlier, the theory of a skid physically attached to the cabinet bottom seemed to have merit. (See Fig. 7.) It serves as a pallet on the conveyor, thus eliminating the need for makeshift, loose pallets that must be repeatedly handled. As shown in Fig. 7, the rolled corrugated skid is held to the cabinet bottom by means of four U-shaped brackets and four wood screws. The item shown consists of a die-cut 200-lb.-test, A-flute corrugated board sheet with kraft liners. The rolls at each side of the basic sheet form three layers. Inside each of the base sheet roll-ups is a cut-scored two-ply A-flute sheet of the same composition, but with the flute direction per-

pendicular to that of the main sheet. This gives more rigidity to the skid, which we needed and which we gained without upgrading the board strength of the material being used.

The skid is formed and glued at the corrugator's plant. This also adds greatly to the rigidity of the piece. Brackets are inserted and the assembly is shipped to us ready for use. Advantages of this attached skid were (1) economy of material, (2) utility on conveyor lines, (3) good cabinet protection during plant handling and final shipment, and (4) elimination of wadding at the bottom of the cabinet—this was necessary when flotation forms were used.

Re-Introduce The Wooden Skid

During the past nine years our television cabinets and chassis have been undergoing alterations in the direction of less bulk and consequently less weight. Further, economy of design in cabinets has recognized that wherever the cabinet legs could be shipped detached without harm to the final appearance of the cabinet much saving would result. These things are important in the industry, since the price line in television has not been allowed to skyrocket as it has with countless other products.

As a result of the foregoing economy of cabinet design plus recent package experimentation, the bulk of our 1959 models now going into production, will again be shipped on a modified wood skid. (See Fig. 8.) The skid is made up as a four-, five-, or six-piece construction. All lumber is hardwood and measures approximately ⅜ in. in thickness. The stock is re-sawn 4 × 4 in. lumber. The deck boards are faced with a sheet of 275-lb.-test, B/C-flute double-walled corrugated board. The corrugated board serves as a cushion between the wood of the skid and the cabinet to prevent chipping of the cabinet veneering.

The skid is provided with four lead holes for No. 8 self-tapping sheet-metal screws which are driven by power drivers directly into the bottom frame of the cabinet. This is done by the cabinet manufacturer as the final operation before closing the corrugated box, and therefore requires no jig or fixture for placement since the corrugated box and the top packing detail position the cabinet automatically. These skids have reduced our material cost over previous corrugated skids and forms by about 30 per cent and are a real asset to shop handling.

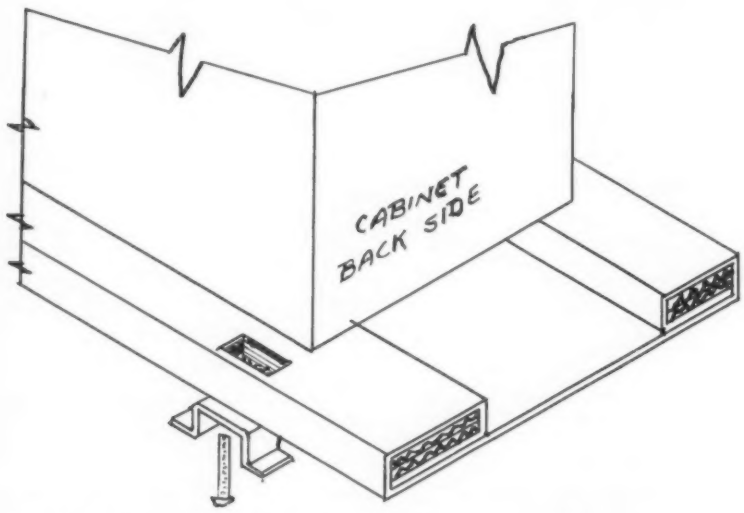

Fig. 7. Rolled corrugated skid attached to cabinet bottom serves as pallet.

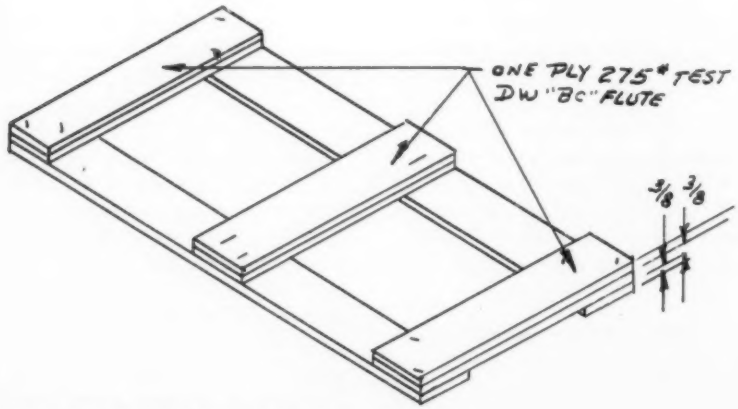

Fig. 8. Modified skid of hardwood for shipping 1959 models.

Key Points Of Program

Summing up our over-all packaging procedure to date, and as we have now refined it, seven points stand out as deserving attention. These are not conclusive, but represent a concise summary of what we do.

1. **Survey** the packaging problem.
2. **Develop** a preliminary design utilizing past experience and idea solicitation.
3. **Check** the design costs to make sure it is in line with existing standards.
4. **Make pre-shipment** tests of products and packages.
5. **Ship** a sufficient quantity to all sections of the country to ascertain the merits of the package.
6. **Re-examine** the package in light of actual shipment findings and make improvements where necessary.
7. **Cut** the package cost through redesign if possible. (*End*)

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Three-point guide aids choice of right polyethylene, helps predict its performance

By David D. James,
Industry Specialist—Packaging,
Polychemicals Department,
E. I. du Pont de Nemours & Company, Inc.
Wilmington

Polyethylene is no longer a packaging material of the future; it has become a packaging material of today. Within months this versatile plastic will reach an annual sales rate of one billion pounds per year. Rapidly advancing technology has made possible films of clarity and thinness previously unheard of in branched polyethylene. The linear polyethylenes likewise offer promise of significant strides in new film properties.

What does the packaging engineer need to know to select the proper polyethylene for a specific application? Although density has begun to emerge as the criterion for how a polyethylene will perform in a package, there are other equally important factors that must be considered in order to predict the performance of a package.

To understand the choice of the proper polyethylene from the packaging use standpoint does not require an extensive background in polymer chemistry. If certain basic terms are understood, the packaging engineer can readily apply available information to his problems.

How Molecules Join

Plastics chemistry began when chemists found out how to make certain molecules join each other in chains of like molecules chemically bonded together. These "super" molecules are the plastic materials we know today. Polyethylene plastic is composed of such molecules synthesized from ethylene gas.

During polymerization, which is the chemist's term for the process of building super molecules, polyethylene molecular chains form branches by an inter- and an intramolecular branching process. It is not necessary to understand why these branches are formed; it is pertinent to understand the nature of the branches and their significance to the properties of a polyethylene.

Long-chain branching occurs from an *intermolecular* mechanism and consists of long chains of like molecules chemically bonded to other long chains. The super molecule of polyethylene, branched in this manner, can be visualized by picturing a tree that has two or more major branches splitting off the main trunk.

Short-chain branching results from an *intramolecular* mechanism and consists of very short chains building at a number of sites as the super molecular chain is built. Returning to the tree analogy, these short chains can be thought of as twigs.

Density

Long-chain branching affects extrusion characteristics rather than film properties. Short-chain branching determines the solid-state behavior of the polyethylene. Further advances in the technology of polyethylene brought about the control of short-chain branching during

In spite of today's attention to density as a tool of polyethylene classification (spurred on by ASTM), other factors, too, are important, according to Mr. James. Melt index and molecular weight distribution also deserve attention. His discussion stresses that the three parameters (density, melt index, and molecular weight distribution) can be controlled in making polyethylene resin to produce whatever properties are specifically desired. Factors he discusses in connection with polyethylene selection include heat sealability, printability, frictional properties, clarity and gloss, toughness, processibility, tensile and yield strength, tear strength, stiffness, flex life, softening temperature, stress-crack resistance, and shrinkability.

manufacture. The less the branching, the closer the molecules pack together, increasing density or crystallinity. Hence, the first of three important variables that can be controlled in manufacturing polyethylene is *density*.

Melt Index

Although many of the properties of polyethylene are dependent on density, other factors are also important to end-use properties. During the process of building long-chain molecules, the lengths of the super molecules can be controlled by proper choice of synthesis conditions. Thus, the average weight of the molecules is controlled. A simple device to measure the effect of molecular weight is actually a measure of melt fluidity (at standard conditions) called *melt index*. This is the second important variable that can be controlled in manufacture.

Molecular Weight Distribution

Finally, the manufacturing process for polyethylene does not produce chains of equal length (weight) under given conditions. Although the process is adjusted to build molecules of about equal length, a distribution of extra-long and extra-short chains is always present in the resin produced. This distribution of long (heavy) and short (lightweight) chains can also be controlled in manufacture and is the third variable—*molecular weight distribution*.

David D. James is a graduate of the University of Pennsylvania with a B.S. degree in mechanical engineering. Joining DuPont following his graduation and prior to becoming industry specialist—packaging, Mr. James has held positions in technical service and in sales for the polychemicals department.

Thus, three parameters (density, melt index, and molecular weight distribution) can be controlled in the manufacture of a polyethylene resin to produce desired properties. A knowledge of density alone neither specifies a resin nor allows a prediction of many of the properties of a film produced from that resin.

A "Tailoring" Job

Properties of a polyethylene film also can be altered by additives incorporated into the resin during manufacture, by the techniques used in film extrusion, and by certain processing techniques.

The ability of resin suppliers to control density, melt index, and molecular weight distribution plus the use of additives has led to the "tailoring" of specific resins for specific uses. Here is where the packaging engineer can profit by this knowledge of the nature of polyethylene.

Applying this knowledge to each of the many film properties that may be desired, the packaging engineer can select the best resin for a specific application. The important film properties, with an exception or two, are all dependent on one or more of the three parameters previously discussed.

Heat Sealability

A polyethylene film should possess the ability to be heat sealed rapidly with good, uniform seal strength without excessively close control of sealing temperature.

Speed of sealing is definitely affected by the base polyethylene resin used to make a film, as polyethylenes vary in softening temperature. The lower the softening temperature, the shorter the sealing time. Fig. 1 shows the parameters of the polyethylene resin that affect softening temperature as measured by Vicat test. A low-density, high-melt-index resin of broad molecular weight distribution yields a fast-sealing film.

Uniformity of seal strength is affected by the temperature range over which the polyethylene softens. If this range is narrow, cou-

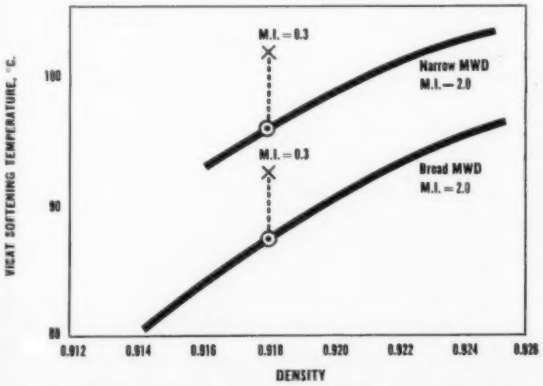


Fig. 1. How the parameters of polyethylene resin affect softening temperature, as measured by Vicat test.

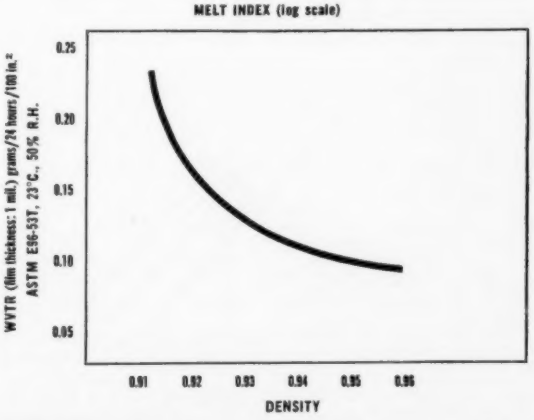


Fig. 2. Water vapor transmission rates. The higher the density the less permeable the film.

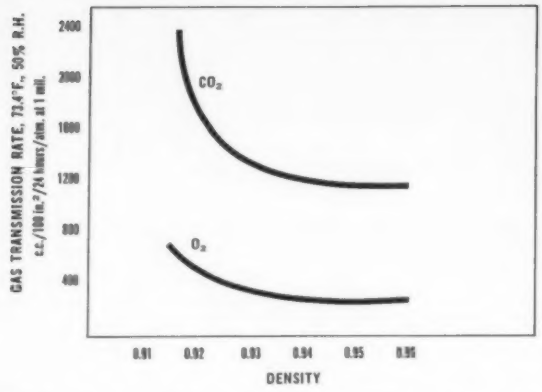


Fig. 3. Gas transmission rates. Greatest differences in barrier properties are between densities of 0.914 and about 0.930.

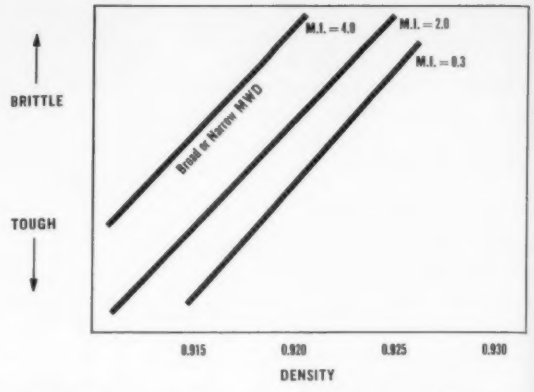


Fig. 4. Qualitative relationship of density and melt index to film toughness. Low-density, low-melt-index resin produces the toughest film.

trol of sealing temperature can become quite critical. Consequently, film of a broad melting range is desirable.

The lower the density of a resin the less crystalline is its structure. Since a crystalline structure melts sharply, while an amorphous structure softens over a broad temperature range, low-density resins exhibit the desired broad range of melting. As higher-density resins are used, better control must be exercised over heat sealing temperatures.

In addition to the selection of resin, some changes in crystallization can occur during processing, thus affecting heat sealability. Slowly cooled film will be more crystalline than quickly cooled film. Thus, slight differences in sealing temperatures may be required, roll-to-roll, of film made from the same base resin.

Heat sealability can also be affected by treatment for printing. New developments in treating techniques have now made possible excellent seal strengths of treated-to-treated surfaces, providing neither surface is overtreated.

Printability

Most packaging applications for polyethylene film require printability. Consequently, the packaging engineer is concerned with the ability of a particular film to be printed economically.

There is no evidence that printability is affected significantly by the three parameters of the base resin. Printability is promoted by treating the film surface by flame or electron bombardment to produce surface oxidation which permits better wetting and adhesion to the surface.

Permeability

Products to be packaged vary widely in the protection they require from the package. Many products must be protected against water vapor and gases permeating through the packaging material; other products require a "breathing" package that allows permeation of gases. Some products or components of the product must be contained with a high degree of impermeability to prevent product loss.

Permeability of polyethylene can be controlled by the base resin

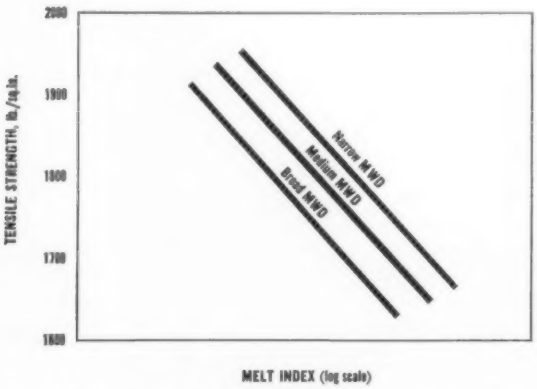


Fig. 5. Tensile strength is a function of both melt index and molecular weight distribution.

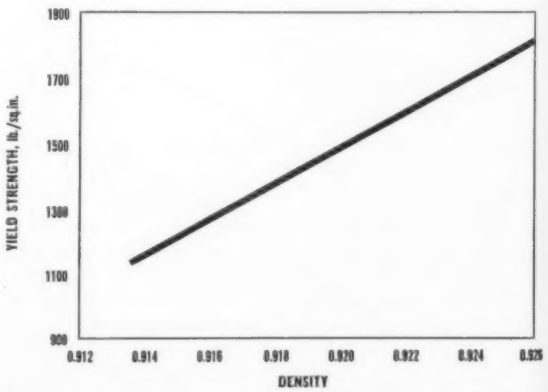
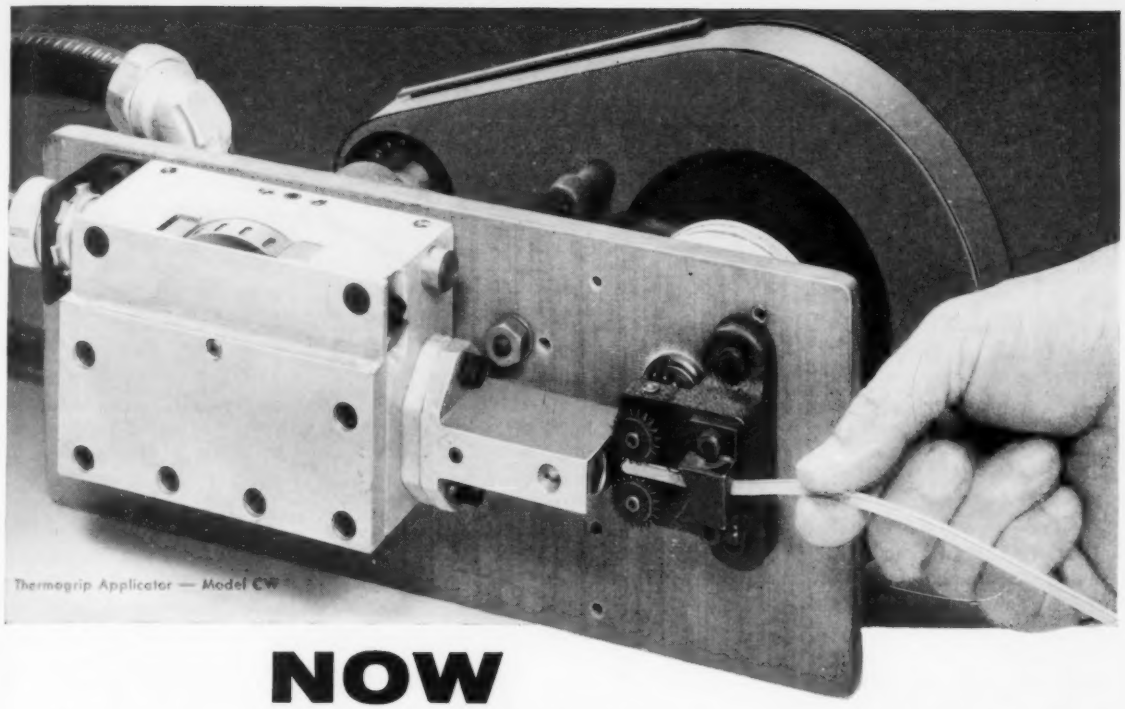


Fig. 6. Yield strength as a function of density. Higher the density of the resin, higher the yield strength.



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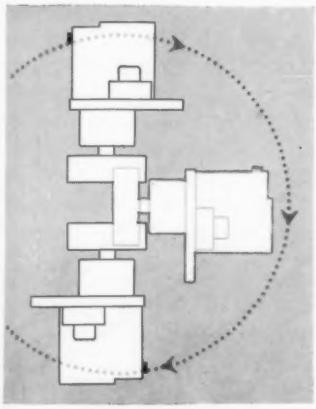

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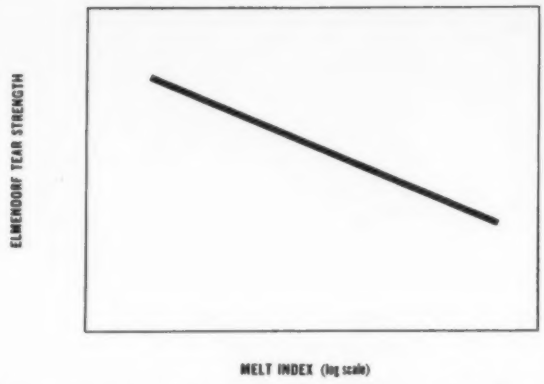


Fig. 7. Elmendorf tear strength is largely a function of melt index. Lower-melt-index resins produce film of high Elmendorf tear strength.

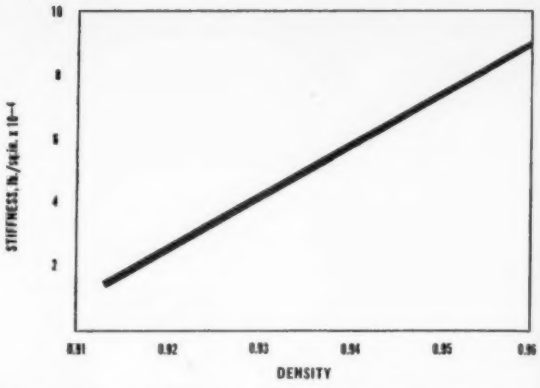


Fig. 8. Density alone determines film stiffness. For greater stiffness, a resin of higher density must be used.

used. In some cases, however, the requirement for very high impermeability must be met by polyethylene in combinations with other barrier materials such as aluminum foil.

Permeability is a function of resin density; the higher the density, the less permeable the film. Figs. 2 and 3 show the water vapor transmission and gas transmission rates, respectively. It should be noted that the greatest differences in barrier properties are produced between densities of 0.914 and about 0.930.

Frictional Properties

In many cases, the ability to use polyethylene in economical, high-speed packaging machinery depends on adequate frictional properties of block and slip. Blocking is the tendency of polyethylene to stick to itself. Blocking often prevents automatic opening of bags. Slip refers to the ability of polyethylene to slide over itself or over guides and other stationary parts of a packaging machine.

These frictional properties depend on the film surface and the base resin. In general, the higher-density films have surfaces of lower friction. On the other hand, the surfaces achieved by film extrusion in making very clear films can exhibit marginal frictional properties. Since clarity is important for many uses, the resin suppliers, through extensive research efforts, have overcome the frictional problems to a large extent by incorporating "slip" and anti-block additives into the base resin.

Clarity And Gloss

Clarity and gloss of polyethylene film are of paramount importance to consumer packaging. In the last five years the industry has made giant strides in improving the appearance of polyethylene film. Prior to 1953, practically all commercial film had a characteristic cloudiness and grain.

However, the first clear films to appear on the market were deficient in toughness. Consequently, to this day some packaging engineers still desire cloudy polyethylene film for applications where toughness is important. Since 1953, better and better compromises have been made between clarity and toughness.

Appearance of film is highly affected by the extrusion conditions,

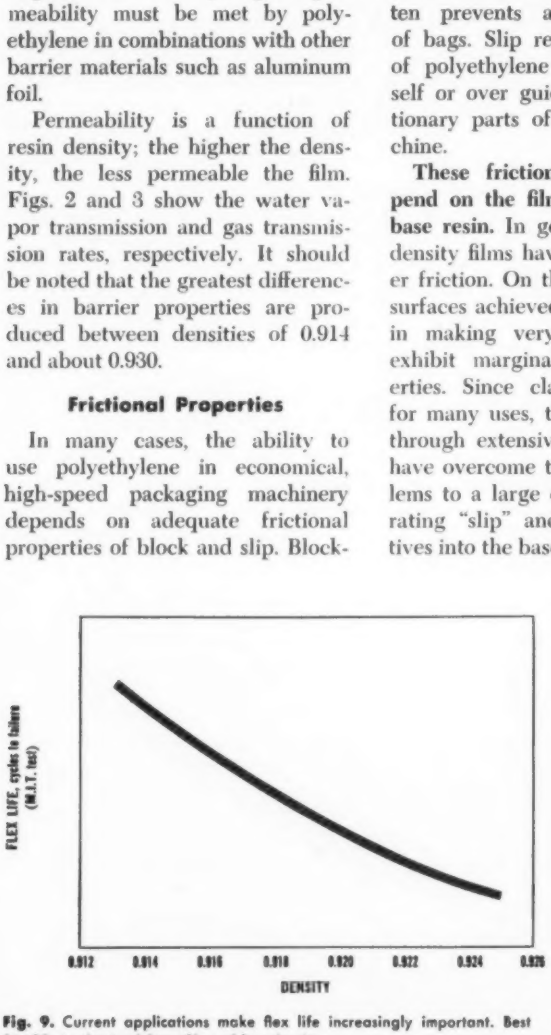


Fig. 9. Current applications make flex life increasingly important. Best flex life is obtained from films of low density.

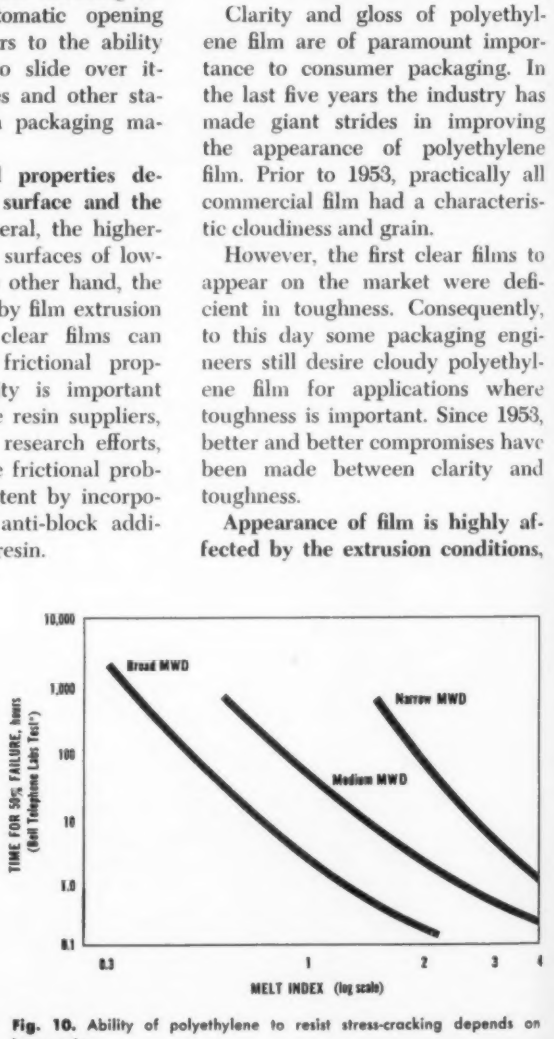


Fig. 10. Ability of polyethylene to resist stress-cracking depends on base resin.

particularly rate of cooling. Such considerations, however, run beyond the scope of this article. Regarding the base resin, as density is increased, surface haze is reduced, although internal haze increases with density. New processing techniques offer promise of low haze in linear polyethylene films, but the clearest films in commercial production today are produced from resins of the 0.923 to 0.930 density range.

Toughness

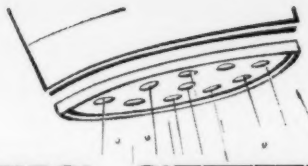
Varying degrees of impact toughness are required for the tremendous variety of products now being packaged in polyethylene, from ping pong balls to potatoes. It has already been stated that good clarity can now be coupled with adequate toughness for many applications. For the ultimate in toughness, however, a significant sacrifice must be made in the appearance of the film.

Toughness is another property of polyethylene that can be varied considerably by extrusion conditions. The degree of orientation (lining up of molecules in orderly arrangement by stretching on cooling) in both the machine and transverse directions is an important factor in determining the toughness of a film.

However, toughness also is a property affected by the base resin. Some polyethylenes make inherently tougher films. Fig. 4 shows qualitatively the relationship of density and melt index to film toughness. A low-density, low-melt-index resin will produce the toughest film. Narrow molecular weight distribution also has a beneficial effect on toughness.

Processibility

Any analysis of polyethylene film properties would be incomplete without a mention of processibility. To the packaging engineer, this property in itself is not too important; it is the concern of the film extruder. However, in picking the right base resin for a specific application, the packaging engi-



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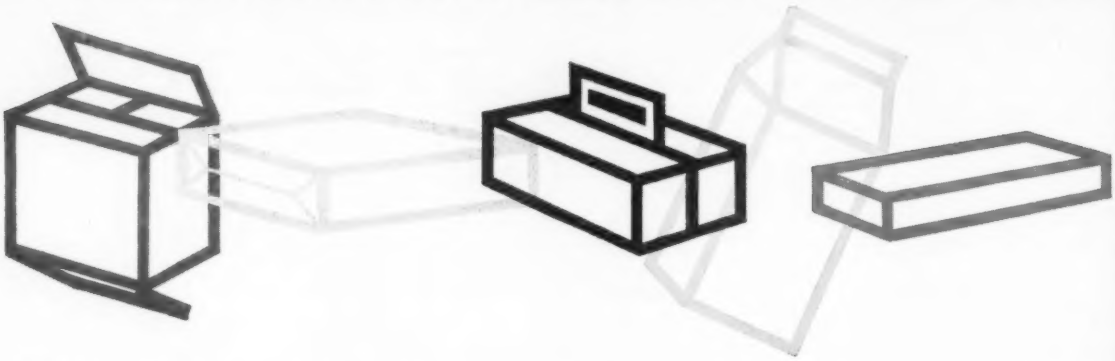

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neer must be aware of the fact that some resins process more easily than do others. The resin that is picked for its properties must be capable of being extruded to the thickness desired at rates economical to the film extruder.

In general, the film extruder finds it more difficult to process resins of lower-melt-index values and of narrower molecular weight distribution.

Tensile And Yield Strength

The packaging engineer must often design durability properties into a package. Shipping and handling of many products require strength in the packaging material. The tensile and yield strengths of a packaging film are thus to be considered in many cases.

Tensile strength is a function of both melt index and molecular weight distribution. Fig. 5 shows this relationship. For the highest tensile strength, a resin of low melt index and narrow molecular weight distribution should be selected.

Yield strength is perhaps even more important to the packaging engineer. Once the yield strength is passed, the package is permanently deformed but not necessarily ruptured. This property is a function of density, as shown in Fig. 6. The higher the density of the resin, the higher the yield strength.

Tear Strength

Tear strength is another property that must often be considered in designing a package. Specifically, Elmendorf tear strength, which measures the propagation of a tear and the variables affecting it, is of interest.

As shown in Fig. 7, Elmendorf tear strength is largely a function of melt index. Lower-melt-index resins produce film of high Elmendorf tear strength.

Stiffness

Stiffness of polyethylene film can be extremely important to the packaging engineer, for stiffness is often the key to packaging "machineability." The stiffness of polyethylene varies from about 10,000 lb/sq. in. to above 125,000 lb/sq. in. The limpness displayed by all polyethylenes, until several years ago, created many a problem at the packaging machine. New resins and new packaging machine designs are now overcoming such problems so that polyethylene can take its place as a standard packaging material.

Density alone determines film stiffness. The relationship is shown in Fig. 8. For greater stiffness, a resin of higher density must be used. Small changes in density can also be introduced by the film extrusion process. The density of the base resin, however, is the major factor.

Flex Life

For most packaging applications, flex life of polyethylene film is of little or no concern. Recent introductions of novel bag-in-a-box constructions, however, are making the consideration of flex life more important to the packaging engineer.

Fig. 9 shows that the best flex life is obtained from films of low density.

Softening Temperature

The advent in recent years of polyethylenes with significantly higher softening temperatures has opened up new packaging fields. The new uses, in turn, have made the consideration of softening temperature important to the packaging engineer. Heat-and-serve pouches fall in this category.

Softening temperature has already been discussed under heat sealability. Referring to Fig. 1, it can be seen that high density, low melt index, and narrow molecular weight distribution are required to produce film of high softening temperature.

Stress-Crack Resistance

Polyethylene while under stress displays a tendency to crack in the presence of certain chemical environments. This phenomenon,

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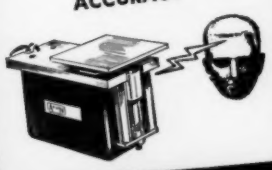

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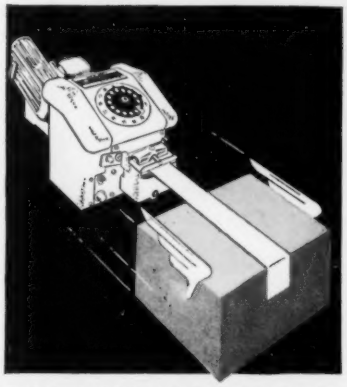

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to be sure, is more important to the design of bottles, tubes, and molded parts. On the other hand, some film applications may require a high degree of stress-crack resistance.

Ability of polyethylene to resist stress-cracking is highly dependent on the base resin as shown in Fig. 10. A narrow molecular weight distribution, coupled with a fairly low melt index produces excellent stress-crack resistance. A very low melt index will also produce excellent resistance even with broad molecular weight distribution. It should be added that high density increases the tendency to stress-crack, but that the increase is minor for resins of low melt index. Thus, the high-density, or linear polyethylenes can be designed for high stress-crack resistance.

Shrinkability

A final property of interest to the packaging engineer is shrinkability. Polyethylene has been used in poultry packaging by taking advantage of this property. Skin-tight packages are achieved by immersing the whole package in a hot bath maintained at about 220°F. A minimum immersion time of 3 sec. is desired.

Two properties of polyethylene film can be tailored for this application: orientation and melting point. The orientation is imparted during the extrusion process. The melting point is a function of resin density. The melting point is kept low by using a low-density resin, thus maintaining a short immersion time.

Conclusion

It is apparent, in reviewing these factors, that compromises must often be made. For example, the requirement for a clear, tough film dictates a high-density resin for clarity and a low-density resin for toughness. Consequently, a resin of intermediate density will usually be chosen as a compromise, with additional toughness available by the use of as low a melt index as can be processed economically.

It is also apparent that the process by which the polyethylene was made is of little concern to the packaging engineer, since, in general, knowledge of the three parameters of a particular resin adequately specifies the resin whether made by the low-pressure or high-pressure process.

In order to promote better communications, the plastics industry and ASTM are attempting to standardize on the following definitions of density of polyethylenes:

Lower density	0.910-0.925 gm/cc.
Medium density	0.926-0.940
Higher density	0.941-0.965

In assessing film properties, however, the effect of melt index and molecular weight distribution of the base resin must be considered, along with density. *(End)*

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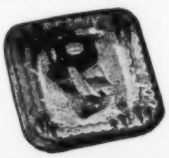

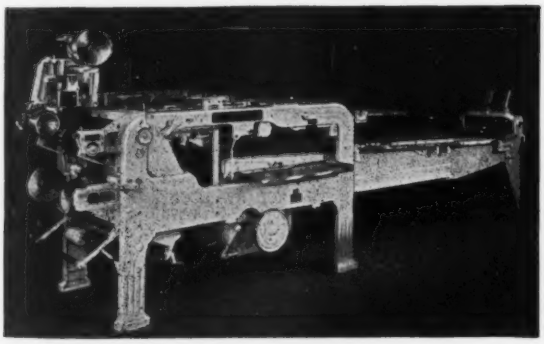

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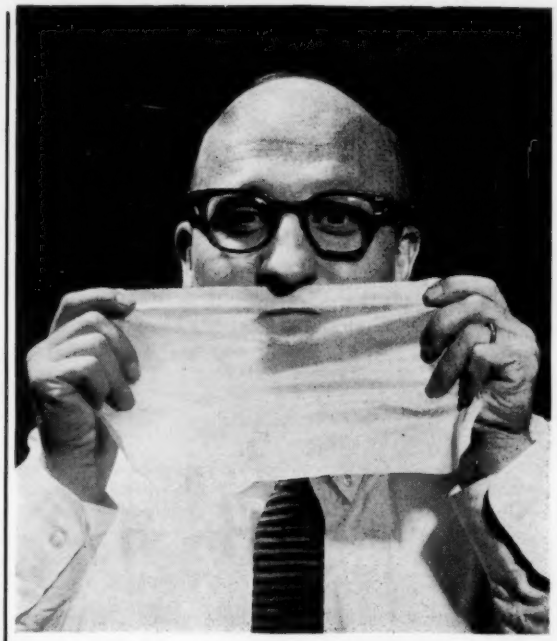

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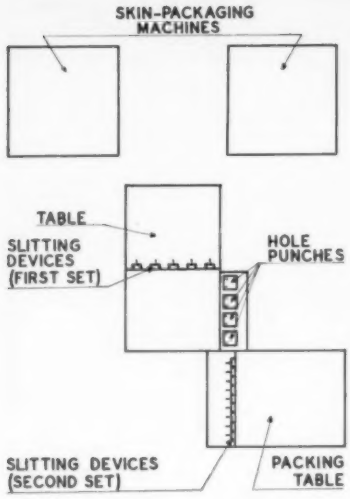


Fig. 1. Skin-packaging line layout.

How to increase efficiency of a skin-packaging line by

Slitting packages into gangs for punching

Punches hanger holes in from four to eight cards in one operation rather than each individually.

By Harry D. Lawrence,
Director of Engineering,
Dowst Manufacturing Company,
Chicago

The Dowst Company's skin-packaging operation for toys is a smooth and efficient one as a result of changing its method of punching the hanger holes in the packages. This method allows punching a gang of cards at one time, which has increased the production rate per operator. In describing the operation, Mr. Lawrence tells how it is done and why.

Changing from an individual hole-punching operation to one in which we punch the hanger holes in our skin-packages in gangs has increased the efficiency of our skin-packaging line a great deal. We now punch the holes in from four to eight cards at a time. Thus, as many as eight operations of this phase have been reduced to one. And on this part of our packaging line (from the machines to the packing station), we decreased the number of girls from five to three.

When we decided about a year and a half ago to change to skin-packaging our toys, we chose to use slitting equipment to separate the individual packages from the master sheet in favor of the well-known die-cutting method. For our particular products, which require several size changeovers a day, this method gives us a smooth packaging operation.

Cards punched individually. Initially, we slit the master sheets containing the skin-packaged toys into individual packages. This operation was performed by one girl. The next step, punching each card individually, required two girls because of the volume produced by the two packaging machines on the line. Two other girls, making a total of five, cased the finished packages ready for shipment.

Studies Punching Operation

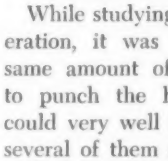
While studying the punching operation, it was obvious that the same amount of motion required to punch the hole in one card could very well be used to punch several of them at one time if the cards were in gangs; also, if the line were equipped with a gang-type punching machine.

This approach appeared to be a sound one because the slitting operation seemed to lend itself to the idea quite well. We could foresee combining the punching and slitting operations into one job. Thus, we developed the line layout and operation we now have.

An alternative to punching the cards on the line would have been to have the holes punched by the supplier when the master sheets were printed. However, after the skin-packaging operation, the vinyl film would cover the holes. Being a tough film, it would be difficult for our customers to punch through it when attempting to hang the packages on a display rack. We have heard of complaints from retailers to this effect.

Line Layout

One of our lines (see Fig. 1) contains two skin-packaging machines facing one another, and spaced approximately 4 ft. apart.



Harry D. Lawrence attended Illinois Institute of Technology for several years. Prior to joining Dowst about six years ago, he was a master mechanic with Davidson Corporation, subsidiary of Mergenthaler Linotype Company, and was in tool design and tool-making with Victor Adding Machine Company. He is a member of Society of Die-Casting Engineers.

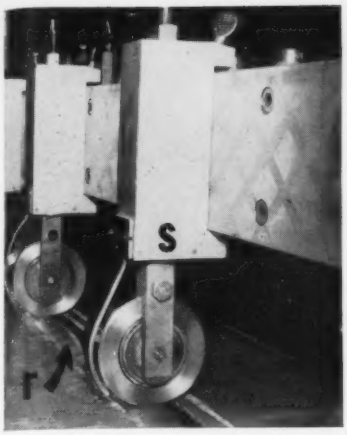


Fig. 2. Slitting device (s) for separating skin packages. Large roller (r), powered and turning continually, contacts wheel knives. This roller carries master card through process.

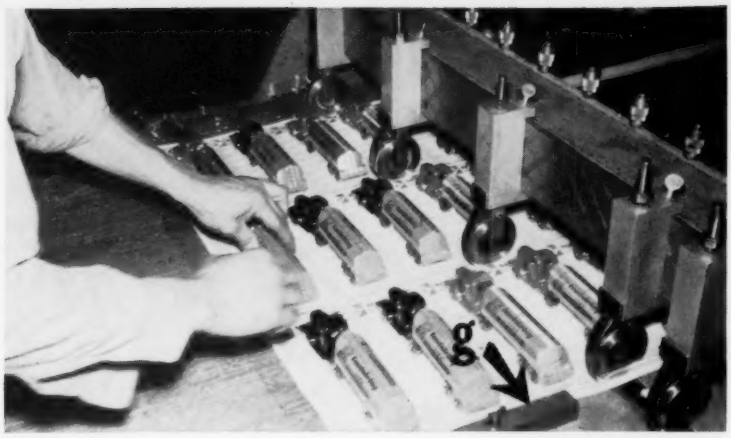


Fig. 3. First set of slitting devices which cut master sheet *across widths* of individual packages thus leaving *gangs* of cards for punching operation. Thus, depending upon finished size of package, a single operation punches from four to eight cards. Note guides (g) which position master sheet properly for slitting.

Adjacent to this space, and positioned at right angles to it, is a table about 5 ft. long. The first slitting operation and punching of the holes in the cards are performed on this table.

Has thumb bolts for fast change-overs. Mounted across the width of the table and centered from end to end is the slitting equipment. It consists of a horizontal framework from which are suspended the slitting devices (s in Fig. 2). Held securely to the framework by thumb bolts, these devices are quickly and easily shifted in a horizontal plane for fast change-overs from one sized card to another.

Use wheel type knives. Each device contains a free-rolling wheel with a sharp cutting edge. The wheel is mounted in a U-shaped bracket whose shaft extends up through, and out the top of, a steel housing. The upper end of the shaft is threaded for vertical adjustment as wear and tear on the cutting edges requires. A lock-nut holds the vertical setting accurately. A metal guard in front of each wheel protects the operator's hands from the sharp edge.

Powered Roller Moves Sheets

A large roller (r) is mounted below a transverse slot in the table top, directly under the slitting equipment. Its curved surface protrudes through the slot just far enough to make contact with the wheel knives of the slitting devices. This point of contact is at the same level as the upper surface of the table top.

Powered and turning continually, this roll carries the master card through the slitters. In Fig. 3, the machine operator has just started a master sheet through the first slitting operation. Note the steel guides (g) at either edge of the master sheet, which position the sheet properly for slitting.

For this first operation, there are five slitting devices since our master sheets contain as many as four lengths of individual cards in one direction. There are nine slitters for the second since there are as many as eight widths of cards in the other direction.

Locate Punches Conveniently

After the card is discharged from this slitting process (see Fig. 4), a girl performs the punching operation. For convenience, a bank (p) of solenoid-operated hole punches (four units in all, each equipped with two plungers) is positioned at right angles to the

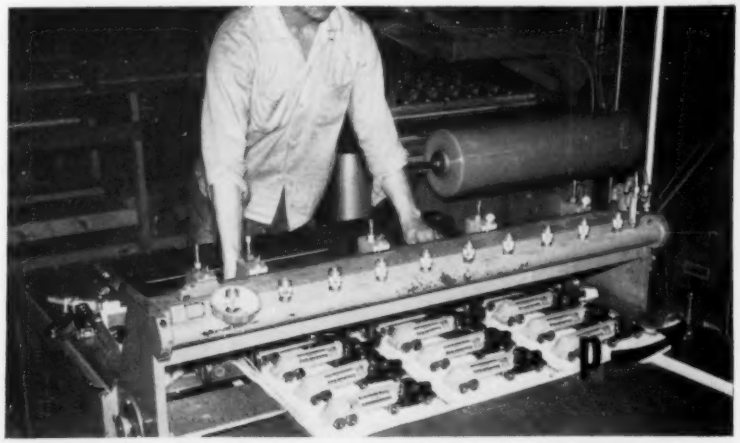


Fig. 4. Gangs of cards discharging from first set of slitting devices. For convenience, a bank (p) of solenoid-operated hole punches (four units in all, each equipped with two plungers) is positioned at right angles to slitting equipment and at edge of table.

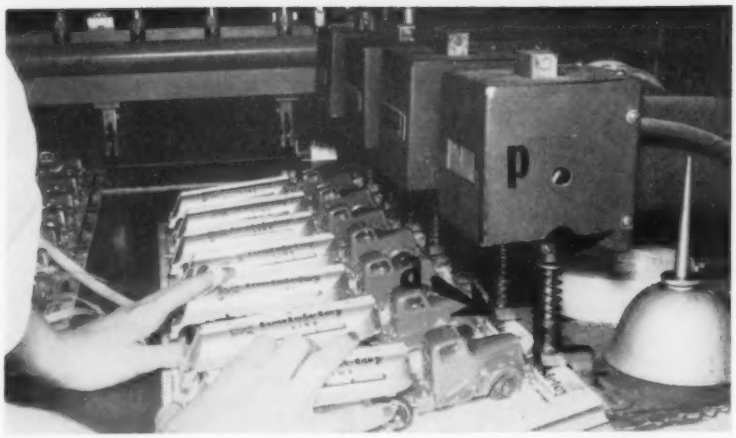


Fig. 5. Girl has inserted gang of cards into angle guides (a) ready to perform punching operation. Punches (p) are actuated by foot switch which leaves girl's hands free. After punching, she moves gang of cards about three feet to second set of slitting knives, which is located in such manner that she never has to turn cards since cards are always oriented in proper direction for each operation.

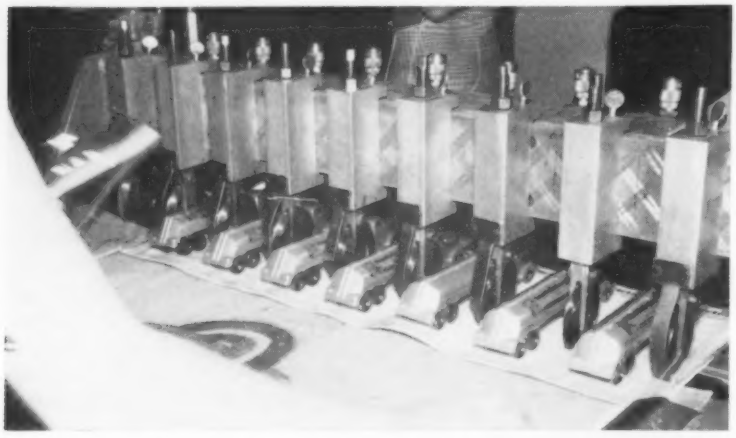


Fig. 6. Gang of cards passing through second set of slitting devices, which separates individual packages.

Fig. 7. Completely finished skin packages arriving on packing table for final operation of casing.

slitting equipment and along the edge of the table (see Figs. 4 and 5). These punches are easily adjusted horizontally to accommodate the different sized cards. Note the angle guides (a) at the lower ends of the plungers, which automatically position the cards.

Uses foot switch. The girl slides the closest gang of cards only a few inches to her right for punching the holes. Actuating the punches by a foot switch which leaves her hands free at all times, the girl completes the punching operation. She then moves the gang of cards approximately three feet to the second set of slitting knives.

Never turns cards. Note in Fig. 1 that the table which supports this second set of slitters is positioned at right angles to the first table. It is arranged this way purposely: **She does not have to turn the cards at any time — only slide them — since the individual cards are always oriented in the proper direction for each operation.**

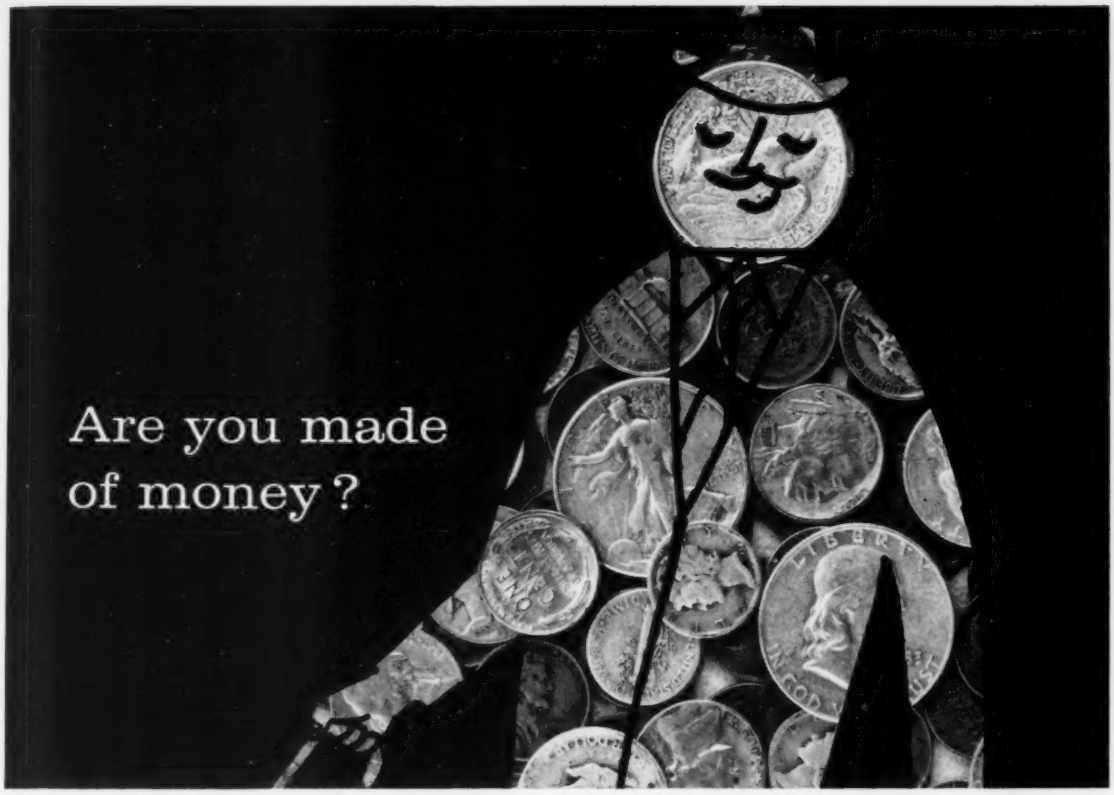
Second Slitting Operation

Aligning the punched gang of cards with the guides, the same girl pushes it forward until it contacts the bite of the submerged roller and second set of slitting devices, which is identical to the first set except for the additional number of cutters. The continually turning roller under the table top carries the cards through the process. (See Fig. 6.)

Making only one-quarter turn to her left, she then punches the second gang of cards, slits them, and so on. Fig. 7 shows the completely finished skin packages arriving on the packing table for the final operation of casing.

Thus, the girl who previously was responsible only for slitting the packages now performs the punching and second slitting operations. With two girls to do the casing, the total number on the line from the machines through the packing operation is three, whereas we required five with the former method of punching the holes individually.

(End)



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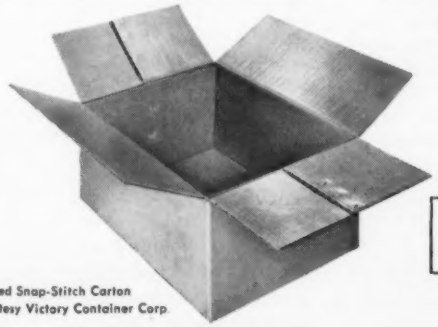

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A practical approach to a weight-control program

The system as a whole, and its installation. Suggests solutions to some specific problems.

By John E. Reynolds,
Industrial Engineer,
The Tool Steel Gear and Pinion Company,
Elmwood Place, Ohio

We tested our filling equipment, analyzed the data derived therefrom, established average overfill and allowable underweights, and set our control limits in Parts I and II of this article. Now we must prepare to install the program and try to solve some of the problems and questions which came up in the first two parts.

THE WEIGHT-CONTROL SYSTEM AS A WHOLE

With all the foregoing established from the tests taken, the weight-control system to be used will be fairly well determined. In general, it should closely follow the pattern outlined below. (See Figs. 4, 5, and 6.*)

1. At a predetermined interval, the person designated by the foreman to do the sampling takes a certain number of production units from a filler.
2. Records the time. (See Fig. 6.)
3. Weighs each sample.
4. Records the variation (±) from the zero point as a whole number on the record sheet. (See Fig. 6.)
5. Calculates the average and range for the samples. (See Fig. 6.)
6. Posts the average to a chart (Fig. 4) which has the previously mentioned control limits drawn on it. Note:
   a. If the average is above the upper limit, the operator adjusts the filler to give lighter weights.
   b. If the average is below the lower limit, the operator adjusts the filler to give heavier weights.
   c. If the average falls between the limits, no adjustment is made.
   d. The amount of adjustment needed in each case can be determined by subsequent testing and/or by experience.
7. If an adjustment is made, this fact plus the amount of adjustment is noted on the record sheet (Fig. 6) in the comments column opposite the average adjusted.
8. Any other occurences or adjustments which might affect the weight are also noted in this manner. (See Fig. 6.)
9. Posts the range figure to the range chart. (See Fig. 5.) Note:
   a. If the range is above the upper limit, steps should be taken to find the cause and correct it.
   b. The lower range limits are rarely used and for our purpose can be ignored.
   c. If the range is between the limits, no adjustments are made.

*(*Editor's note: All illustrations and equations are found in Parts I and II of this article which appeared in the last two months' issues.*)

INSTALLATION OF THE WEIGHT-CONTROL SYSTEM

The first step in the installation of a weight-control system is to sell the operating personnel on the idea. The best instrument for this is a cost picture showing the amount of product in dollars and cents that this system will save the company.

From the previous tests, an average overfill per package was obtained ($\bar{\bar{X}}$ in Fig. 1). From our later calculations (Equation 7), we arrived at an average overfill necessary to obtain a certain percentage of underweight packages. The difference between these two values is either the average savings in product per package or the weight which must be added to each package to produce the desired percentage of underweight packages.

When the present overfill is greater than the desired overfill, there is a potential savings. With a yearly production figure and an average value for the product, a yearly savings figure can be pre-

In this last part of a three-part article, Mr. Reynolds outlines a pattern which a good weight-control system should follow. He also goes into the various factors involved when installing such a program. Ending with a general discussion, he reviews some of the Food and Drug laws as they pertain to package weights, and suggests possible solutions to the questions and problems raised in the first two parts.

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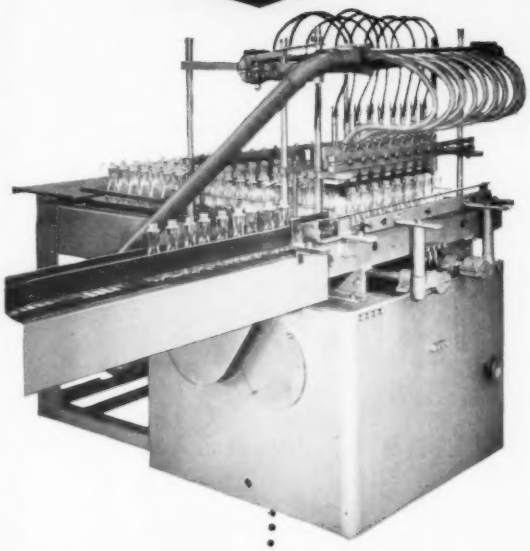

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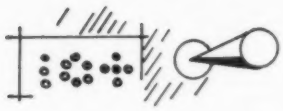
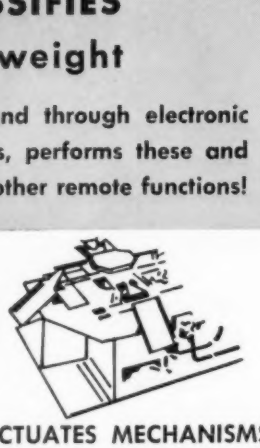
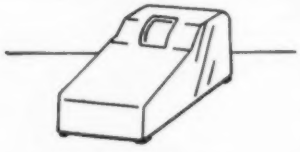


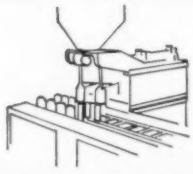
OPERATES SIGNALS



ACTUATES MECHANISMS



RECORDS DATA



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dicted through the use of a weight-control system. However, should the present overfill be less than the desired overfill, as in the case of our example, then you have been underfilling, and governmental troubles resulting from this should be stressed.

Other considerations which are useful are:

1. Standardization of product.
2. A guarantee against violations of Pure Food and Drug laws.
3. A permanent check on machine accuracy.

No New Personnel Required

In most cases, no new personnel need be added. Usually it is a matter that the old system of checking is converted to the new system; more effective use of time and personnel is made.

Although the person installing the system may, and should, make suggestions, **it is the duty of the supervisor to decide who is to do the sampling and weighing. This must be determined before the system can be installed.**

The most effective means of gaining the confidence and support of the production personnel is to address them personally on the advantages of the system. Tell them what the company expects to get out of it, what is expected of them, advantages to them, etc. At the same time, the new equipment such as scales should be introduced.

When the new system is initiated, the person installing the system must be present to instruct the people in the proper methods to be used. He must answer questions and smooth out any rough spots that may be encountered. **Close supervision should be maintained for at least two weeks to be sure the system is faithfully followed.**

RECORDING AND REPORTING DATA

Once the system is operating, a record should be kept of the day-to-day averages and ranges of the various fillers (as in Fig. 6). This data will provide a continuous

record of the weight-control program in each department. It will point up areas that need improvement, provide a basis for purchasing new filling equipment, indicate when a filler is not operating satisfactorily, indicate needed control-limit changes, etc. It will also provide the data for reporting to management the overfill and underfill situation in each department.

GENERAL DISCUSSION

The purpose of this section is to try to solve some of the questions and problems raised at the beginning of this article. These suggestions are strictly my own opinion and should be accepted in that light.

Unfortunately, the Pure Food and Drug laws do not provide clear answers to some of the problems raised here. Therefore, in every organization, someone concerned with package weight control will be obliged to stick his neck out with an opinion as to how some of these problems are to be resolved. It is my hope to provide here a few clues which will aid in the solution of these problems.

Weight Increases Or Losses After Packaging

Fortunately, the law is somewhat helpful on this point in that **the packages in any shipment entering interstate commerce cannot average less than the stated weight on the package.** This eliminates the possibility of purposely packaging underweight in order to take advantage of weight increases later on.

Normally, products which will increase in weight must be shipped immediately after packaging. Therefore, most of the increase in weight occurs on the dealers' shelves or after the product enters interstate commerce. **In this case, packaging underweight would almost certainly mean shipping underweight, clearly in violation of the law.**

Loss in weight. On the other side of the ledger are those items which

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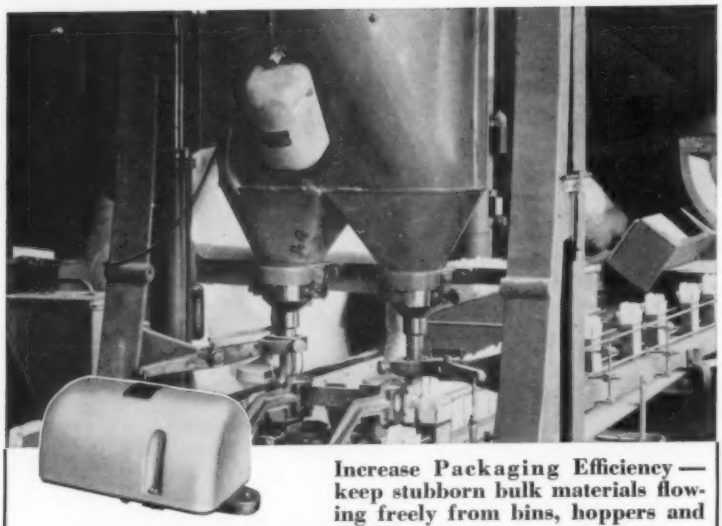

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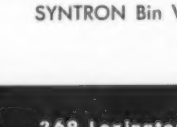
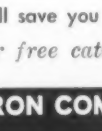
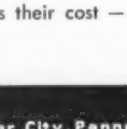


PACKER AND JOLTERS

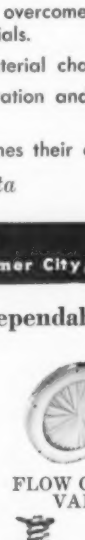


HOPPER LEVEL SWITCHES



FLOW CONTROL VALVES

VIBRATING SCREENS



SPIRAL ELEVATOR FEEDERS

lose weight after packaging, notably spices. Again, **the law is clear enough on this point in that the product has to be packaged slightly overweight so that by the time it is shipped, it will not have dropped below the stated weight.** Beyond that, it is not felt that any compensation need be added for weight lost on the retail shelves.

To support this, the Pure Food and Drug law states,

> "Variations from the stated weight, measure, or numerical count shall be permitted when caused by ordinary and customary exposure after the food is introduced into interstate commerce, to conditions which normally occur in good distribution practice and which unavoidably result in change of weight or measure."

Items such as spices that lose weight usually have long shelf life. Therefore, it is not imperative that they be shipped immediately after packaging. A check of the average length of time in storage before shipping and of laboratory studies on weight loss should indicate the amount of overweight at which these items should be packaged.

What Per Cent Underweight, What Per Cent Overweight?

Theoretically, every package filled is exactly the weight stated on the label. But theory and practicality are far from being the same in this instance.

It is a known fact that every filling machine gives a weight-distribution curve. With any given average, therefore, some per cent of the packages produced must fall underweight. For our control purposes and from what we have quoted from the Pure Food and Drug Law, we can eliminate any under-filling, which means the resulting average package weight will give between 0 and 50 per cent underweight packages.

The law is not too clear in that it states that manufacturers are allowed ". . . variations from the stated weight . . . which occur in good packing practice . . ." and, ". . . variations shall not be permitted to such extent that the average of the quantities in the

packages comprising a shipment . . . is below the quantity stated."

Theoretically then, a manufacturer may set his filling lines at 50 per cent under and 50 per cent over, and meet the letter of the law. This sounds fine, but from a practical standpoint it cannot be done except by adjusting the weight in each package as it is produced. Such a system is usually not economically feasible.

Average Weight Rises And Falls

It is a known fact that fillers not only will produce a weight distribution, but **the average weight of the packages produced will rise or fall over a period of time.** This is caused by either the inaccuracies of the machine or variations in the materials being packaged, or by a combination of both. If this were not true, there would be no need for weight-control systems.

If this shift in weight were always to the heavy side, it would be possible to package at 50-50, since the average over-all weight would always be above the stated label weight. **If the shift were always to the light side,** then the starting underweight would have to be somewhat less than 50 per cent. This is due to the fact that it would be desirable, and even necessary, to catch the change in average before it went below the stated label weight. **If the shift in average was to either extreme,** again the initial underweight would be less than 50 per cent to allow for the shifts toward the light side.

We are dealing with distribution. Therefore, it is well to remember that, although a sample may average underweight, one must assume that it has resulted from a correct average distribution. However, when a sample average falls outside the control limits, this assumption must be dropped, as this is an indication that the average distribution is no longer correct.

Problem pertains to each filler. The problem of what per cent underweight is permissable, or what

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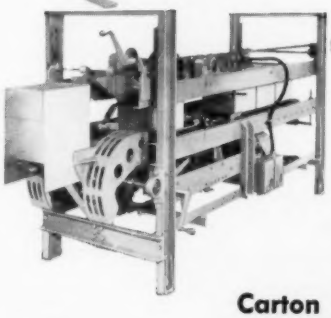

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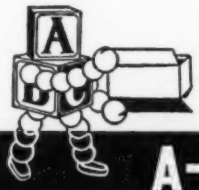

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Objects are stored in the same Rondo tray even in open stacking to assure quick count for checking or inventory. These filled Rondo trays are then directly packed in cartons for bulk shipping, or slipped into folding boxes for dispatching small units.

In shipment, the shock-absorbing features are fully realized. Each object is actually suspended in a cushion of air and separated from the others by the same means. No padding is needed because Rondo itself virtually eliminates breakage from impact.

Upon arrival, each object is easily accessible, no time is lost in unwrapping or untangling. The filled Rondo tray may be combined with a decorative folding box, cellophane cover, or without reloading, it can be inserted directly in a point-of-sale display.

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Consult us about your possible application of the Rondo method. Present facilities will accommodate objects from 8 to 26mm in diameter. Tooling for larger sizes possible.

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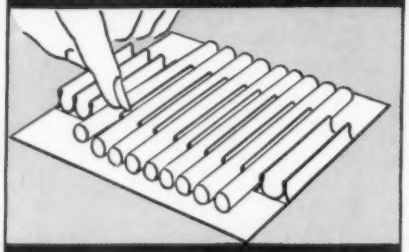
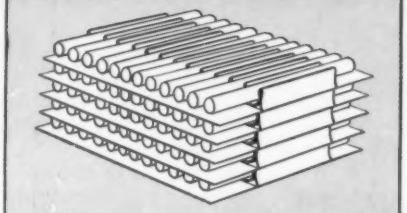
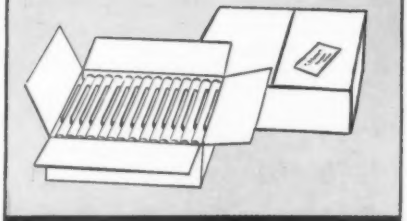


EASY STACKING AND STORAGE



SAFE RIDE IN SHIPMENT



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the average weight should be, has to be solved for each individual filler and filling line. This decision will have to be based on the following considerations:

1. How often will the line be sampled?
2. What per cent of the total production does the sampling represent?
3. How often does a shift in average occur?
4. How far will this shift in average go before it is caught?
5. Over a period of time (two or three weeks), how close to a temporary test average was it possible to hold the overall average?
6. How large a weight distribution does the filler produce?
7. What is the dollar value of the product that will be overfilled at the various underweight per cents?

All of these considerations will have some bearing in deciding upon the average overfill. My personal experience has been that the per cent underweight will generally fall between 10 and 35 per cent.

After deciding upon a per cent underweight and a resulting overfill, the weight controls are put into effect. It will then be well to **examine the operating data from time to time to determine if the average overfill should be revised. This will often be the case as weight controls tend to stabilize weight variations, and savings can often be realized through another overfill reduction.**

The Problem Of Tare Weights

The best solution to a problem of excessive variation in the tare weights is to eliminate the tare weight itself. This usually calls for a large amount of ingenuity, and at this point a few examples will prove helpful.

On a canned bean line, it might be necessary to weigh only the bean fill exclusive of the sauce fill. Pouring the sauce off the beans into a sample container for an accurate weighing would be difficult. In addition, the can weight may vary enough to throw the bean weight off quite a bit. **The solution would be to use several stainless steel cylinders exactly the size of the bean cans and equipped with screen bottoms.** These cylinders must be balanced to an equal

weight so that the tare weight plus the desired bean weight can be set on the scale.

These cylinders are then sent through the filler. The sauce will drain off automatically through the screen bottom. The beans are then flushed under a water tap and the cylinder containing the washed beans weighed. After the variation from the desired weight is read and recorded, the beans can be dumped back into the filler hopper. A rack with a screen bottom to hold the cylinders after they are filled will also prove very helpful.

Package containing individual units. Another example of eliminating a tare weight could be that of a tea bag production line. It is suggested that the weight controls be based on the production units, or cartons, of tea bags rather than the individual bags since the declared label weight is based on the box-content weight.

The weight variation in the empty bag, string, tag, and staple is negligible, but the variation in empty box weights is often greater than the variation in tea fill. Dumping the contents of the boxes onto a scale platform would soon find the weight-control operator knee deep in tea bags.

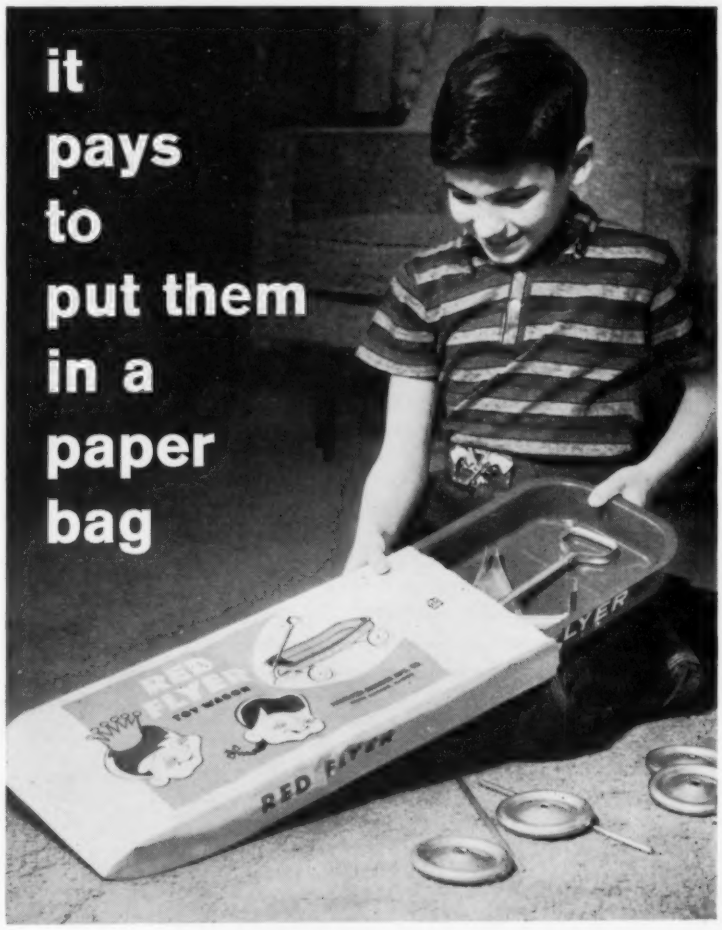
The solution here will be found in lidless tin boxes slightly smaller than the production units. All of these boxes must be balanced to the same weight so that the tin box plus the desired tea fill plus the string, staples, etc., add up to an even figure.

Instead of the regular production cartons, the proper number of these tin boxes are filled at the appointed sampling times and weighed on the scale tared for the expected gross weight. After the variations from zero are recorded on the control chart, the contents of each sample box can be dumped directly into a regular production carton and returned to the line. **With this procedure, the net effect is no time lost and no production lost.**

Use unit weights. To simplify

when you pack "knock-downs" for

HOME ASSEMBLY



Compact, convenient paper bags make excellent security agents for packaged home-assembly products. They speed packing, help lower shipping and handling costs, conserve valuable warehouse and shelf space.

Take the toy wagon bag, above. It packs 22 put-'em-together metal parts. Bag replaces carton, is lighter, less expensive. Colorful printing serves as economical advertising for brand name and contents.

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scale adjustments for different sized packages, unit weights can be made for the different sizes. When a size is changed, for instance from a 16- to a 48-count tea bag carton, the only adjustment necessary is to change the unit weight on the tare platform of the scale. Unit weights of this sort are usually available from some of the scale companies.

Note, from the previous examples, that it is desirable to return the samples to production as quickly as possible. This is easily done, when regular production units are removed and weighed, by simply placing them back onto the production line. Another method is to dump the contents into a scoop placed on the scale. From here it can either be dumped back into the regular container or into a larger vessel provided for this purpose. Then, of course, when this large vessel is filled, its contents will be returned to the filler hopper.

With some products, it is absolutely necessary to use a scoop as described above, and return them to their individual containers as quickly as possible. Thus, a large vessel for accumulating samples may not be used. **An example of such a product is ground coffee packed in one-pound cans or jars.**

Due to the weight variations in the containers, it is necessary to dump the coffee into the scoop for weighing. Since this product in ground form will go stale if exposed to air very long, **it cannot be accumulated over a period of time and later sent back to the filler hopper. It must be returned to its regular container so it can be sealed immediately.** However, dumping this product into the scoop causes it to "fluff up." This increases its volume to the point where it is larger than the volume of the container.

Use vibrating plate. One means of resolving this problem is to construct a stand with a funnel suspended over a vibrating plate. When the product is dumped into the scoop for weighing, the empty can or jar is placed on the plate directly under the funnel. After the weights are recorded, the coffee is dumped into the funnel, and the vibration causes the product to settle down in the container. When filled, the package can be returned to the line for sealing. Depending upon the production line rate, and for faster weighing, it may be necessary and more practical to have several funnels mounted over a large vibrating plate.

Cannot Eliminate Some Tare Weights

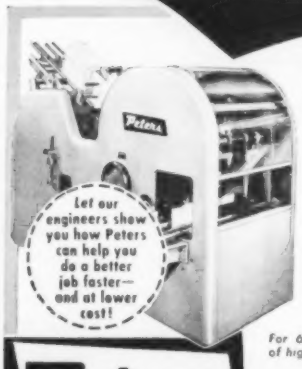
So far, three or four successful means of eliminating tare weights have been described. Sooner or later, however, the occasion will arise where they cannot be eliminated, such as the peanut butter example previously mentioned. The best solution to be offered nullifies this variation as much as possible.

Sampling tare packages. This

Peters

Model SE Carton Forming & Lining Machine

automatically forms and lines up to 120 cartons per minute



Another high-speed, cost-cutting packaging machine—Peters Model SE Carton Former and Liner—cuts roll-fed paper to proper size liner sheets . . . then folds liner sheets and low cost carton blanks together to form perfectly shaped lined cartons. Can be made adjustable to set up a variety of sizes for lard, shortening, tea bags, cookies, etc. Write for catalog describing this and other Peters packaging machines.

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can be done by setting up a sampling procedure on the tare packages as they are placed on the production line. **It must be done on the same basis as that for the finished product.** Samples are taken and weighed. The calculations are made and the averages are plotted on the chart containing the control limits. The average derived from this sampling must be used for the tare weight in sampling the finished product. The tare weight must be adjusted whenever the tare sampling shows it to be necessary.

The finished weight-control limits must be calculated on the variation of the finished weight (fill plus tare). The average desired, however, will be based only on the variation of the fill since the tare controls take care of the tare variation.

Hot Products. One problem not covered yet is that of the hot jars on a jelly or preserves production line. This is one of those problems where you do the best you can with what you have. The idea of pre-weighing tare weights is very effective here, but the main difficulty is the heat.

One of the best solutions is to equip the weight-control operator with a pair of insulating gloves. If any spillage occurs, allowances must be made for it in the system. This allowance might take the form of a slight, added overfill in computing the desired average weight of product.

Use weights to determine volume. This type of weight control has also proven effective on production lines where the product has a declared volume rather than a declared weight. **The one prerequisite for this to operate effectively is that the density of the product remain relatively constant.**

In most cases, weighing a package is much simpler than any method of determining volume. Conversion from determining volume to weighing will enable the operator to take more samples and maintain tighter controls. This often results in quite a bit of savings. On items such as milk in a paperboard container in which the volume varies considerably, weight controls have proven very effective, much more so than any attempts at a volume control. (*End*)

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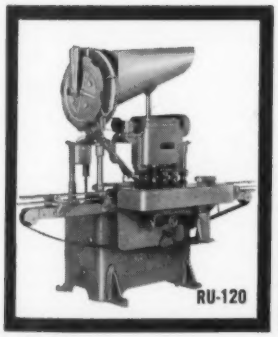

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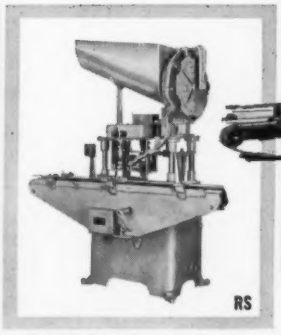
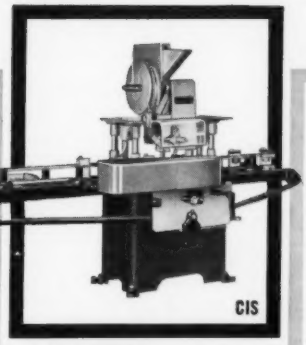
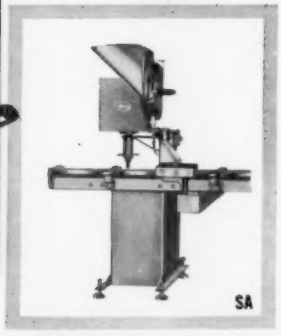
HIGH SPEED SCREW CAPPER
Operation is smooth and simple. Seating and tightening of caps takes place while containers are in straight line. Variable speed drive. Quick, simple changeover. Speeds up to 250 per min.



Fully automatic
SCREW CAPPER
Available with single head right or left-hand drive. Seats, feeds and applies a great variety of caps to bottles, jars or cans from ½ oz. to gallons. Speeds up to 60 per min.



Fully automatic
INNERSEALER
Automatically sorts, feeds and applies innerseals to various sizes of rectangular cans such as used in the lubricating industry. Can be installed in existing lines where cappers already are in operation or applied in tandem with new cappers. Speeds up to 120 per min.



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APPLICATOR
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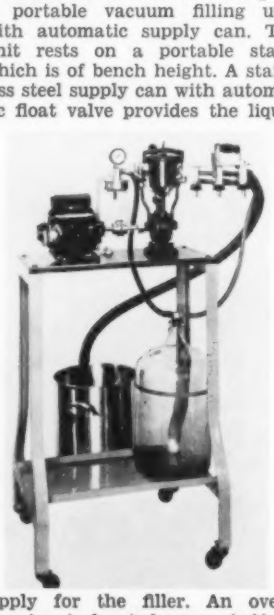
Semi-Automatic Set-Up Machine

Gaylord Container Corp., Div. Crown Zellerbach Corp., has developed a semi-automatic machine for setting up Whalley one-piece beer boxes. The machine consists of two separate units, (1) a bottom sealer, and (2) a lid stitcher. When the box comes off the machine, the sealer glues the double bottom and passes the box via a roller conveyor to the stitching unit which forms the lids, leaving them double stitched and open. The resin adhesive for the bottom sealing has been specially developed for use on this machine. The glue pot contains a thermostatically controlled heating unit which keeps the quick-set adhesive at proper bonding temperature. Circle No. 1.

Portable Vacuum Filler

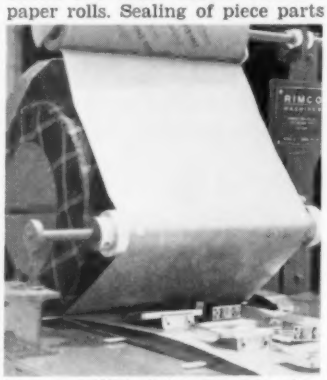
Scientific Filter Co. has designed a portable vacuum filling unit with automatic supply can. The unit rests on a portable stand which is of bench height. A stainless steel supply can with automatic float valve provides the liquid



supply for the filler. An overflow jug is located on a shelf at the bottom of the stand where it can also be used as liquid supply when required. Filler is useful for long and short runs of all types of liquids in both glass and tin, as well as some types of plastic containers. Circle No. 2.

Automatic Wrapper

Rimbach Mfg. Co., Inc., announces its automatic wrapping machine which seals piece parts between two latex coated cohesive paper rolls. Sealing of piece parts



is accomplished by pressure between 2 sponge rubber cylinders. The unit works without any heat, hydraulic, or air pressure. Automatic electric cut-off attachment cuts finished packages to any size. Rates from 10 to 100 pkgs/min. are attained. Width of paper rolls is adjustable from 3" to 12". Piece parts to max. hgt. of 2" are accommodated. Circle No. 3.

Creped Wadding Cushioning

Kimberly-Clark Corp. announces Super Crepe Kimpak, a creped wadding cushioning material with a high concentration of crepes in each ply. The material is said to prove excellent for blocking and bracing, flotation, absorbent packing, and surface protection packaging for delicate and fragile items. It is available in thicknesses ranging from 0.04" to 0.50", bleached or unbleached, or in combination in a full choice of sizes in either roll or sheet form. A variety of backing papers is available. Circle No. 4.

Round Container Printing

Cosom Engineering Corp. has a new machine for printing side walls of containers, tumblers, or drums. Called the Cosomatic rotary flexographic printer, the unit handles open end containers with tapered as well as straight walls, and also prints containers with flanged or flared openings. 4,000 pieces/hr can be printed. Circle No. 5.

Casing Aerosol Containers

Emhart Mfg. Co.'s Portland Div. has designed a machine for the automatic casing of empty aerosol containers. Handling two cases at a time, the unit puts 7 oz. or 12 oz. containers through the line at the rate of 240 cans/min. in a 3×4×1 pattern. Changing over grid and pusher plates to handle either can size takes 15 min., Emhart says. Empty aerosols are lowered, not rolled, into the cases to prevent chipping or scratching of can finish. Circle No. 6.

Pressure Sealed Containers

Stone Container Corp. announces its new Stik-Kwik process for hand sealing boxes with precoated self-stick flaps. Matching areas of latex-base coating (shown dyed in the photo for visibility) stick

together on contact. No stitching, taping, or gluing equipment is needed. Boxes are stored flat and set up as needed. Telescope-style box here is formed by sealing sticky flaps rather than stitching. Circle No. 7.

Uncasing Unit

Radio Corp. of America announces development of an uncaser for handling various types and sizes of cans, jars, and bottles. Adjusting for change in container size requires less than 1 min., RCA says, and changeover from cans to bottles can be made in less than 5 min. The box, with flaps open, is fed into the machine, passing under a "plow" device which holds the flaps back. The case is inverted, a spring mounted vibrator contacts the bottom of the box, and the contents are deposited in an upright position on the belt leading to filling units. Circle No. 8.

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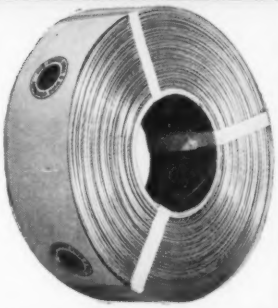

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New Polyethylene Film

Koppers Co. has developed a high-density polyethylene film manufactured from Super Dylan Type 6060F. The film is the result of experiments in the high melt index range. It is said to possess a high degree of clarity and gloss, and sufficient stiffness to handle well in packaging equipment. Higher heat resistance and quick set-up permit it to be sealed at faster rates, Koppers says. Circle No. 9.

Automatic Former-Loader-Sealer

J. L. Ferguson Co. has developed an automatic convertible former-loader-sealer designed to load paint cans, with wire bails attached, into end-loading corrugated cases. Part of the Packomatic line, the machine (1) feeds knocked-down corrugated shipping containers into (2) a fully mechanical case-forming mechanism from which cases are positioned (3) to accept paint cans which have passed through a special bail-orientation and bail-positioning section of the machine. After end-loading, (4) the case is sealed and (5) mechanically turned to the conveyor. Circle No. 10.

Filling Machine For Containers

Hedwin Corp. has introduced an automatic filling machine, Model FM-2, for Cubitainer users whose quantity requirements are in the range of 1,200 1-gal. or 400 5-gal. units/8 hr. Model FM-2 inflates and fills Cubitainers automatically. One operator is required to apply the empty package and touch a start switch. In production, rates of 3 1-gal. units/min. or 1 5-gal. unit/min. are obtained. Accuracy of filling is obtained by utilizing the beam balance principle with the filled weight independent of liquid temperature and other variables. Circle No. 11.

Bag Loader

Bemis Bro. Bag Co. announces a new building materials bag loader for packing large or odd-shaped sheets of wallboard, plywood, accoustical tile, high - density insulation sheeting, laminated plastic sheets, etc. The unit consists of a horizontal sheet-metal bed mounted on a steel frame approx. table height. The mouth of the loader has metal fins which provide a means of securing a bag to the loader. An electrically-powered ram pushes product into a special paper bag, usually a sewn tape-bottom bag constructed of single ply 70 # kraft, with reinforcing strips inside each gusset. Circle No. 12.

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Automatic Air Cleaners

U. S. Bottlers Machinery Co. has issued a brochure discussing its Sanitair automatic compressed air cleaner, now available in two models. Model DS-12 handles from 50 to 275 containers/min., and Model DS-8 can handle from 35 to 140 containers/min., depending on container size and design. Both machines feature duplex stations which carry two containers through the cleaning operation in opposed position so that one is inverted while the other is uprighted for discharge. Circle No. **101.**

Tape Dispensers

Better Packages, Inc., has issued Resale Catalog 107 which illustrates and gives specifications for 28 different models of tape dispensers that handle gummed sealing tapes or pressure sensitive tapes. Circle No. **102.**

Boilable Food Packages

Minnesota Mining & Mfg. Co., Film Products Group, has prepared a laboratory report on heat-in-the-package food preparation. The report discusses the advantages of boilable food packages and the fabrication of the pouches, as well as describing packaging and cooking procedures. Circle No. **103.**

Liquid Filler Valve

Karl Kiefer Machine Co. offers information on its newly developed stem casing which pressure fills to an exact limit into any type of container without the use of a seal. Split second cut-off is achieved through use of a vacuum liquid level control when product reaches the predetermined height. The valve is recommended for use on plastic bottles, sanitary cans, and wide mouth bottles especially. Circle No. **104.**

Bin Vibrators

Eriez Mfg. Co. has added two new models of bin vibrators to its line. Model V3B-40P (new impact) and Model V3B-40S (semi-noiseless) are for use on bins, chutes, hoppers, etc., with wall thickness not exceeding 3/16" and having a capacity of approx. 20 cu. ft. Circle No. **105.**

Packaging Machinery

Stokes & Smith Div. of Food Machinery & Chemical Corp. has released a 4-page folder describing its complete line of equipment. Illustrated throughout, the folder covers such machinery as fillers, checkweighers, carton filling and sealing machines, casers, contour wrapping machines, box and tray forming equipment, wrapping machines, and set-up paper box machinery. Circle No. **106.**

Accumulator And Bundler

Hayssen Mfg. Co. has an illustrated bulletin telling how savings can be effected by bundling unit packages together in film or paper wraps, eliminating the need for intermediate cartons or bags. Labeling and imprinting units are available for use with this equipment. Circle No. **107.**

Vibrators

Martin Engineering Co. has a catalog describing its various types of vibrators. The devices are air-operated and can be mounted on hoppers, chutes, screens, etc. Units break arching and keep stubborn materials moving. Circle No. **108.**

Automatic Packaging Machinery

Sunstrand Machine Tool Co. has released a folder on Model 50 in its Packmaster line of automatic packaging machinery. Model 50 handles from 40 to 80 packages/min., depending on size, and counts the total number of packages made. A dotting mechanism is available which marks every 25th, 50th, etc., package. A variety of packaging materials can be accommodated on this machine, including combination poly kraft and polyethylene cellophane, Jan. B-121 flat or crepe, and Jan. P-117 Types 1 and 2. Circle No. **109.**

Non-Slip Coating

Paisley Products, Inc., Div. Morningstar-Paisley, has published the Horowitz report, which offers data on its non-slip coating No. 1715. This coating is sprayed on corrugated shipping containers or blanks to prevent stacked goods from skidding and toppling during movement, vibration, and handling. Other data on coating No. 1715 lists recommended methods for its application and case histories from users of this material. Circle No. **110.**

Marking & Addressing Machines

Weber Marking Systems has a folder showing how many different marking jobs can be accomplished with its handprinters and label printing machines, in shipping, receiving, production, inspection, storage, tool room, order processing, and general office departments. Circle No. **111.**

Elevating Feeder

The Lakso Co. has released a data sheet on its Model 54 elevating feeder for loading of capsules and tablets into high hoppers on filling machines. Model 54 features a waist-high hopper of 9 cu. ft. capacity, a vibrating feeder screen, and a conveyor that lifts tablets to the desired height and discharges them into a filling machine hopper. Up to 55,000 aspirin tablets/min. have been handled by Model 54. Feed is automatically controlled. Circle No. **112.**

Automatic Jaw Sealer-Labeler

Doughboy Industries, Inc., has a two-page data sheet on its new automatic jaw sealer, labeler, Model PJS. Head labels are applied and bags sealed in one complete operation for cellophane and coated cello bags, polyethylene, saran, etc. Machine holds bag for the complete sealing cycle, enabling operator to increase production up to 50%. Circle No. **113.**

New Size Metal Container

Crown Cork & Seal Co., Inc., offers data on its newly developed intermediate sized can, a 2-base, 29 oz. juice can known as the Crown 2-29. It is the same height as the conventional 46-oz. can and can be run through the same equipment. Circle No. **114.**

Carton Printer

Algene Marking Equipment Co. has a data sheet that pictures and describes a fully automatic knockdown carton printer. Feeding flat cartons from a hopper, this unit will print up to 3,000/hr. and is designed as an in-plant printing machine. Type sizes range from 1/8" to 5", and the unit features fast-drying liquid ink. Circle No. **115.**

Pressure Sensitive Tape

Behr-Manning Co. has an illustrated folder describing the popular uses of 22 of its pressure sensitive tapes. Circle No. **116.**

Oil And Grease Resistant Paper

Thilmany Pulp & Paper Co. has a demonstration kit to show the oil and grease resistance of Thilco Repel paper. The kit contains samples of ordinary kraft paper and Thilco Repel paper and capsules of oil, enabling you to see in your own office the performance of this paper. Circle No. **117.**

Vacuumizing Attachment

Ralph Chaffee & Co. has designed a vacuumizing attachment for its Rotor-Sealer, US 5 Star Model. Chaffee says this device makes it possible to vacuumize a package before it is fed into the heat sealing machine, and reduces expenses for this operation. Circle No. **118.**

Package Tying Machine

B. H. Bunn Co. manufactures 9 different types of automatic tying ma-

chines, described in a catalog. Handling packages, regardless of shape, that can be tied by hand, these machines wrap twine around the package to the proper tension, tying the twine into a non-slip double-loop knot, and then cut the twine. These units adjust automatically to handle packages of varying sizes successively, tying the average package in less than 2 sec. Circle No. **119.**

Industrial Films Available

Eastman Chemical Products, Inc., offers a booklet describing six films available for showing without charge from Eastman. Ranging in length from 7 to 30 minutes, the films include "Half-Second Butyrate," a protective coating for exterior aluminum surfaces; "The Case of the Disappearing Poison," a discussion of TEPP insecticides "Butyrate Peelable Plastic Packaging;" "Portrait in Plastics," an historical glance at the development of Tenite plastics; "Plastic Pipelines," and "The Story of Tenite," which shows how Eastman plastics are manufactured and where they are used. Circle No. **120.**

Plastic Screw-Caps

The Poly-Seal Corp. offers an illustrated folder describing the advantages of the Poly-Seal closure, a plastic screw-cap with a polyethylene cone liner. It eliminates leakage, evaporation, contamination, binding, and back-off. Adapted to high-speed capping machines, it overcomes the pumping action of liquids due to atmospheric pressure or temperature changes. Closure is available in a wide variety of styles. Circle No. **121.**

Case And Bag Checkweigher

Exact Weight Scale Co. has literature available on its new Selectrol Model 1250, an automatic case and bag checkweigher. It is designed to handle cases, cartons, and bags from 20 lb. up to 100 lb. Accuracy is said to be .1 of 1% on products within that weight range. Speeds up to 30 items/min. are obtainable. The unit is available with or without a rejector mechanism, with underweight rejection only, or with underweight and overweight rejection through the same reject channel. Circle No. **122.**

Metal Fitting For Pails/Drums

Upressit Metal Cap Corp. offers information on its Uni-Grip, a completely assembled metal fitting for pails and drums. It consists of gasketed nozzle, vented pouring spout, shipping band, and cap. The fitting uses the standard 2-3/8" opening. The push-pull rigid metal spout assures full, even flow of product. A snap-type cap with polyethylene-faced line affords protection against leaking and evaporation. Circle No. **123.**

Polyethylene Bag Sealing

Carbert Mfg. Co. offers an illustrated data sheet giving specifications for the Model 1010 polyethylene bag sealing unit. The machine provides automatic high-speed sealing, producing a filled, snug contour package with a hairline seal. Bags handled range from 4" x 4" to 12" x 12". Circle No. **124.**

Vacuum Fillers & Body Labelers

Biner-Ellison Machinery Co. manufactures a line of fillers and labelers that are described in one of its catalogs. Specifications and pictures are given for 9 different machines, some of which fill and label simultaneously. The fillers are designed to vacuum-fill still liquids, and the labelers apply body labels, handling a wide range of glass containers and label sizes. Circle No. **125.**

Heavy Duty Limit Switches

Micro Switch, Div. Minneapolis-Honeywell Regulator Co., recently issued a 16-page catalog, No. 84, covering its line of heavy duty limit switches. Details of three types of switches for industrial uses—the plug-in "200LS" series, the "LS" series, and the "ML" switches—are included. Circle No. **126.**

Corrugated Carton Reinforcement

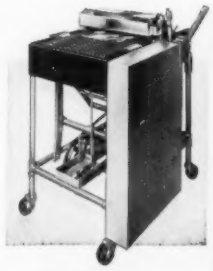
Chicago Printed String Co. offers Bulletin No. RT-1800, which describes presently accepted methods of using high tensile tape to reinforce corrugated cartons to provide hand hole, side wall, or corner score reinforcement. The tape is incorporated into the board at the time of board manufacture and requires no separate processing. Also included are descriptions of reinforced bulk pack and hexagonal drumpack corrugated cartons, also using tape

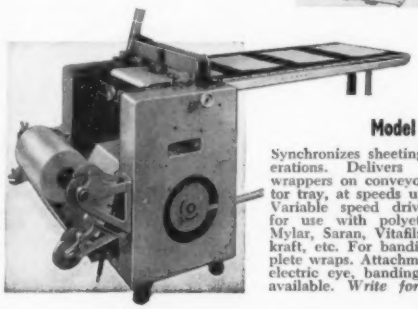
CORLEY-MILLER FOR ECONOMICAL WRAPPING . SHEETING . HEAT SEALING

Corley-Miller Model MPS WRAPPING MACHINE

Semi-automatic. Wraps a great variety of package sizes. Readjusts speedily. Wraps up to 21 packages per minute. Uses roll wrapping material or cut-to-size sheets. Gluing mechanism available for non-heat sealable wrappers. Many time and labor saving attachments available. Popular for single unit wraps and for bundles. Also wraps open trays, some bottles.

Write for Bulletin





Corley-Miller Model BL SHEETER-GLUER

Synchronizes sheeting and wrapping operations. Delivers pre-glued or dry wrappers on conveyor or into accumulator tray, at speeds up to 36 per minute. Variable speed drive sets pace. Ideal for use with polyethylene, cellophane, Mylar, Saran, Vitafilm, acetate, glassine, kraft, etc. For banding as well as complete wraps. Attachments such as slitters, electric eye, banding trough and others available. *Write for Bulletin*

Corley-Miller Model KW "KWIK-WRAP" SHEETER

Cuts sheets of polyethylene, Saran, Mylar, Cry-O-Vac, acetate, or other films from rolls. Delivers cut sheets to finger tips of one or more operators . . . up to 36 sheets per minute. Operates by trip or continuous. Ties in perfectly with conveyorized hand wrapping of cheese, meats, textiles, etc. Two models. 16" and 24" roll widths. Simple, compact, mobile, low-priced.

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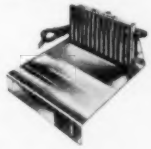
Write for Complete Hot-Plate Bulletins

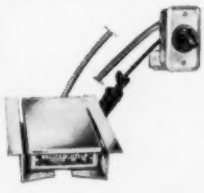
Model BJ Vertical Polyethylene Sealer

Widely used for sealing polyethylene. Ideal for textile wrapping or comparable work. Vertical ribbed polyethylene sealing surface 5" high by 10" wide, removable for Cellophane or other films. Thermostatic control.



Models BKR and BUR Close-Control Hot Plates

Premium quality plates for close temperature work. Perfect for Saran, Pliofilm, and cellophane too. Thermostat is durable, remote control, precision type. Raised or flush mounting. BKR, 5" x 10" draws 500 watts. BUR, 10" x 10" draws 1,000 watts.



Miller Wrapping & Sealing Machine Co.

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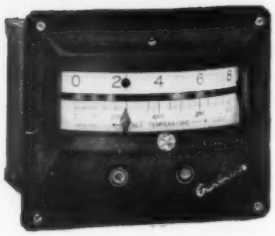

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This *tube-free* instrument brings many advantages over *any* on-off controller. *Anticipates* temperature change, tends to stabilize at *closer* tolerance. Cuts rejects, maintenance; ends adjustment, tube-replacement. Reliability *Guaranteed.* Write for Bulletin JP-1.

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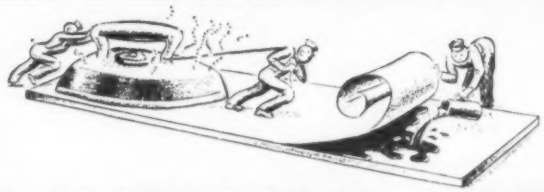

LAMINATING ADHESIVES

We have tried to apply the resistless force of perseverance in plugging our Proxmelt Concentrates over the years, by means of diagrams, funny paper characters and statistical profundities.

Inherent stubborness or misguided bias has nothing to do with this case. We simply have observed that our customers show unrestrained approval and heart-warming loyalty for Proxmelt Concentrates. Now, after such a pompous, pedantic declaration as this, you should expect (and are entitled to) a few qualifying remarks.

Take Proxmelt No. 30-104-3 for example, a 30% butyl rubber dispersion in microwax. This is the laminator's most highly esteemed helpmate. The reason? Well, he merely tosses a few slabs of Proxmelt into a low temperature melt tank, and then adds micro and a shot of resin. This goop is then stirred casually and fed to almost any kind of heat laminator. It works like a charm in laminating Glassine to itself, to paper and to board . . . sulphite bond or C1S to chip . . . 10 pt. to 10 pt. patent coated, etc. ad infinitum. And all this, mind you, with no concern about fancy rigs, high temperatures, pin-point control etc. It's smooth, man! . . . smooth running in a nice low range around 225° F, and at speeds that really pay.

There's a free chunk of this amazing stuff ready for your request at any time. Your Lab gang will bless you for your inspired initiative. One brief line will send it on its way—and at no obligation whatever.

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Pyroxylin
PRODUCTS, INC.

for reinforcement and rip-open features. Circle No. **127.**

Polyethylene Technology Handbook

U. S. Industrial Chemicals Co. has released a detailed handbook concerning the technology of polyethylene plastic, from basic chemistry of the resins to fabrication of end products. This 100-page handbook, Petrothene* Polyethylene—A Processing Guide, includes sections on the properties of polyethylene resins, information on various end products, techniques for producing them, etc. Charts, tables, and photographs illustrate the guide. Circle No. **128.**

Marking And Printing Equipment

Popper & Sons, Inc., offers Bulletin No. 458R which profusely illustrates a wide variety of marking and imprinting machines, ranging from manual to fully automatic units, employing offset or direct printing techniques. These units can imprint on glass, paper, foil, and on round or flat surfaces. Each machine is carefully described and specifications are provided. Circle No. **129.**

Collapsible Tube Reference

Wheeling Stamping Co. has a 6-page, easy-to-use reference for selecting and specifying collapsible tubes, plastic closures and specialties, and custom molded tips and caps. The brochure includes illustrations and stock-size tables for general purpose closures, collapsible tube caps, snap-on sifter and liquid dispensing fitments, and stock specialty items such as two-piece dispenser caps, polyethylene eye cups, etc. Circle No. **130.**

Steel Drums

Vulcan Containers, Inc., offers literature on its various types of drums. Included in one folder are descriptions of open head and tight head drums (55 gal. capacity and 15 gal. capacity), grease drums (120 lb. and 100 lb. capacities), and 55 gal. agitator drums. All drums are available with a choice of steel, rust preventative, or Hi-Bake protective lining interiors. Circle No. **131.**

Package Testing Machinery

Testing Machines, Inc., has a folder containing bulletins of all its testing units. These number in the hundreds and include impact, stress and strain, compression, and crush testing machines among others. Prevailing prices are included. Circle No. **132.**

Cushioning Material

Vanant Co., Inc., has an illustrated brochure describing its Sus-Rap inner packaging material. Sus-Rap is used for cushioning such items as radios, electric motors, typewriters, foils, films, and paper stock, glass, porcelain enamelware and delicate mechanisms. Circle No. **133.**

Polyethylene Film

Spencer Chemical Co. has published a comparative film property data sheet. It compares its Poly-Eth Hi-D 2504 with conventional density polyethylene in respect to such characteristics as melt index, tensile strength, elongation, tear strength, etc., and refers to the

All the Crackers you sell deserve the protection of

WAXED GLASSINE

Sales-Power Packaging begins with Lower-Cost WAXED GLASSINE

One sure way to sell today... Use wraps of Waxed Glassine inside, Waxed Paper outside! Pre-sold protection helps make Your Brand a buying habit!

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PROTECTS FRESHNESS AND FLAVOR
P

ASTM test methods used. Circle No. **134.**

Stainless Steel Containers

U. S. Steel Products Div. manufactures a complete line of stainless steel drums and pails that are described in a 4-page folder. Containers of 5 to 55 gal. capacities are standard, but special sizes are available. These containers protect against the contamination of such products as acids, chemicals, drugs, foods, etc. Circle No. **135.**

Stretchable Paper

West Virginia Pulp & Paper Co. has a 4-page brochure describing its Kraftsman Clupak stretchable paper. Clupak features a built-in stretch which allows the paper to yield on impact. Butt drop tests have shown it to be tougher than regular kraft paper and able to absorb more energy. Circle No. **136.**

Printing On Corrugated

Hinde & Dauch offers No. 8 in its Little Packaging Library series, a booklet entitled "How to Use Printing on Corrugated." Such topics as printing with flexible plates, printing in color, coloring the liner, and embossing are covered. Circle No. **137.**

Foil Carton Board

Cochran Foil Corp. offers a booklet discussing the history and properties of foil carton board, as well as scoring and die cutting, printing on foil, designing on foil, and care of stock prior to printing. Circle No. **138.**

Candy Pop Wrapping Machine

Wrap-Ade Machine Co., Inc. manufactures a candy pop unit packaging machine that is described in a current data sheet. Machine is said to use 50% less cellophane than with twist type wraps. Variable speed control ranges from 75 to 150 pops/min., producing a completely heat sealed package. Circle No. **139.**

Aerosol Pressure Filling

Alpha Engineering & Machine Works, Inc., has several data sheets on its Model 220 Roto-Gas machine. A 15-head rotary gassing machine, it was developed for fast charging of aerosol containers filled with liquid or semi-liquid foods and related products. It is specially built to be used when the propellant is compressed nitrogen or other compressed gasses. It can handle 120 cans/min. with a 6-sec. gassing time. Model 220 features a rotary seal on top of the unit for the gassing connection, stainless steel gassing valves, and a no can—no charge device. Circle No. **140.**

Stencil Supplies

Reynolds Inks, Inc., has recently issued a brochure describing its various aerosol products. Some of the products illustrated are stencil inks, available in nine colors (a color card is included in the brochure), layout ink, Stencil-Kover (a tan colored obliterating fluid), Sherolite (waterproofer), Penetrol (rust preventative), and Collodial Graphite (lubricant). All products are aerosol packaged. Circle No. **141.**

Automatic Bulk Scale

Richardson Scale Co. offers information on its newly-designed Model MSM mechanical bulk weighing scale. This unit will weigh and record dry, granular, sluggish, powdered, and dusty materials. It is a gravity-flow mechanical system. Capacities are from 20 to 50 lb. with volumes up to 5 cu. ft. A totalizing counter on the bulk weighing scale provides continuous information on material weights. Circle No. **142.**

Bundle Wrapper

Battle Creek Packaging Machines, Inc., has a four-page catalog describing its Model 48 bundle wrapper. Pictures, drawings, and specification listings are included for this machine which is capable of handling bundle operations within a variety of sizes at speeds up to 60 bundles/min. Items 6-1/4" to 12" long, 2" to 7-1/2" wide, and 2" to 4-1/4" high can be accommodated on this machine. Circle No. **143.**

Cushioned Shipping Bags

Jet-Pak, Inc., offers a data sheet on its cushioned shipping bags for premiums and novelties. A list of mill representatives from whom samples and prices can be obtained is included. Circle No. **144.**

Box Set-Up Film

United Shoe Machinery Corp. is making available a film demonstrating

WHO HAS BEEN WRECKING OUR REFRIGERATORS!

That was the question a leading manufacturer asked not long ago. But nobody had an answer.

The shipper blamed the carrier, the carrier felt it was the shipper's fault and there the matter stood.

Then someone had a bright idea. Why not use an IMPACT-O-GRAPH to get the facts?

So they did—concealing an IMPACT-O-GRAPH in the packaged product after it came off the assembly line.

It was discovered that the damage was caused by the labeling operation. The person doing the labeling would drop the container on its side rather than label in an upright position. This discovery cut damage claims by 20%.

The IMPACT-O-GRAPH is a three-way shock recorder that tells you when a package receives rough handling plus the extent and direction of the shock. With this data it's a simple matter to track down the cause of damage.

Hundreds of leading companies now use IMPACT-O-GRAPH. Write today and learn how it can help you reduce shipping damage. It's National Safe Transit approved.

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Carton 40-60 Units Per Minute—with just one operator—at LOW MACHINE COST

Just one compact, efficient machine—with just one operator—will handle almost any product you package in reverse tuck folding cartons, at the rate of 10,000, 15,000, 18,000 packages per day. Yet, installed and turning out steady production, costs less than $5000!

REDINGTON automax CYCLE CARTONER

feeds and forms cartons, places them in conveyor pockets. One operator places the item to be cartoned in each of the three loading troughs, then pushes slide forward and back. AUTOMAX tucks in end flaps, discharges finished packages, restarts the cycle—*all automatically!*

Solidly built for long, trouble-free service, AUTOMAX is just 70" long, 30" wide, weighs only 750 lbs. It's caster-mounted—move it anywhere in the plant you need it, even where floor space is limited. Perfect for tubes, bottles, toys, parts, hardware—whatever you carton.

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For more information circle No. 241 on Card

For more information circle No. 242 on Card

the operation of its Boxmaster unit for setting up rigid boxes from flat blanks. Filmed in color, this 18-min. presentation shows how time, space, and money can be saved by performing the set-up operation right in the plant. Circle No. **145.**

Foot Power Staplers

Fastener Corp. has a four-page folder illustrating a line of Duo-Fast staplers for packing, shipping, and woodworking industries. The models described in this folder are designed to handle almost any stapling situation that might arise in such industries. Pictures of the staplers in action are included. Circle No. **146.**

Automatic Packager

General Packaging Equipment Co. has a four-page brochure on its automatic package forming, filling, and sealing machine. It forms pillow style packages from a variety of heat-sealable films at speeds ranging from 30 to 60 pkgs./min. Maximum package size is 6-1/2" x 12". Circle No. **147.**

Marking Attachment

Adolph Gottscho, Inc., has a four-page bulletin, ROL-3, containing illustrations, descriptions, and complete specifications of the Rolacoder friction-type case-marking and coding attachment. The bulletin includes full details on the new Series 300 machine, a re-designed unit with many improvements over the earlier Series 100 and 800. Circle No. **148.**

Polymer Resin-Coated Films

American Viscose Corp., Film Div., offers a revised edition of its brochure "Characteristics and Uses" of cellophane. Included are descriptions of the polymer resin-coated films RS-1, RS-2, and REO. The pocket-size folder lists all available types of Avisco cellophane and briefly describes physical properties and general uses. Circle No. **149.**

Rubberized Hair Cushioning

Armour and Co., Cushioning Products Div., has an 8-page folder on its Hairflex cushioning products. This resilient, lightweight material is said to be resistant to moisture and fungus, is non-abrading and durable. Hairflex packs and molds are reusable. Circle No. **150.**

Aluminum Closures & Sealing Machines

Aluminum Company of America, Closures Div., has a 30-page brochure describing and picturing various aluminum cap styles. Also included in the booklet are illustrations and specifications for a number of Alseco sealing machines, which accommodate bottles ranging in height from 1" to 18". Circle No. **151.**

Side-Weld Poly Bag Machine

G. T. Schjeldahl Co. offers information on its "S"-16 side-weld polyethylene bag machine. This unit is designed for running printed or unprinted tubing or sheet stock, flat or gusseted. Sizes accommodated range from 3"x3" to 40"x40". Instead of the punching system, the "S"-16 has continuously-rotating hollow drill heads which insure symmetrical holes. Circle No. **152.**

(Turn Page)

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Produces a BETTER PACKAGE from a Standard Paper Bag at Big Savings

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BUFFALO 13, N.Y.

Aerosol Crimping Machines

John R. Nalbach Engineering Co., Inc., offers Circular No. XIV describing its complete line of aerosol crimpers. Detailed drawings and complete specifications for these machines are included. Circle No. **153.**

Set-Up Box Machine

FMC Packaging Machinery Div. has published Bulletin B-510 giving specifications and listing operating features on the new Mark 60 Quad Stayer. Handling thermoplastic stay tape, this unit features automatic stack feeding, adjustment-free feeding of warped, lined board, quick change of discharge direction, and fast size changeover. Circle No. **154.**

Polyethylene Cartridge Printing

Markem Machine Co. offers information on its Model 20A marker, a machine that automatically feeds, prints, and ejects filled polyethylene ink cartridges for pen refills. Speeds up to 180 cartridges min. are attained. Cartridges are fed from a magazine with a capacity of 3,000 pieces. Circle No. **155.**

Cellophane Data

E. I. du Pont de Nemours & Co. (Inc.), Film Dept., has a gate-fold brochure, A-6166, that lists the properties and uses of 30 varieties of cellophane for the packaging requirements of many products. It includes a chart showing the yield, thickness, principal uses, and properties of plain, moistureproof, heat sealing, and polymer-coated films. Circle No. **156.**

Bottle And Can Filling

Perl Machine Mfg. Co. has a 4-page bulletin on its straight line bottle and can filling machines. Four different models are pictured and their specifications (including capacities are given. Circle No. **157.**

Bag Packager

Errich International Corp. has a specification sheet on its Speedy Bag Packager, which opens both lip and flush-ended polyethylene bags of paper and film, at speeds up to 1,500 bags/hr., depending upon the type of bag. Circle No. **158.**

Automatic Bag Maker/Filler/Sealer

Triangle Package Machinery Co. offers 3-D color slides and viewer showing its new L-2 automatic bag maker, filler, and sealer. The machine handles from 55 to 60 3-oz. pkgs/min.; 50 to 55 8-oz. bags/min; or 40 to 45 1-lb. bags/min. It can be equipped with net weight scales, volumetric filling head, or for hand loading. Circle No. **159.**

Unit Packaging Equipment

Conapac Corp. has a brochure on its complete line of Roto-Wrap unit packaging equipment. Included are descriptions of the Model B-6 and Model B-9 for unit packaging; the Gas Pak Model 300 for food packers; Model K, a four-track strip packaging machine; and Model 200, an ultra high-speed strip packager for coated and uncoated tablets. Photographs and specifications for each machine are included in this brochure. Circle No. **160.**

Roller Chain Lubricant

McGlaughlin Oil Co. offers information on its Chain Lube, a lubricant for roller chain conveyors. The product is said to be useful wherever roller chain is part of a packaging line. Circle No. **161.**

Basic principles explain web forming and tensioning

(Continued from Page 22)

tive. This causes a loss of control of the web.

(2) As shown in Fig. 5, **the dancer roll travels vertically against the tension of a spring as the web feed begins.** When the spring load build-up reaches the amount required, the web roll begins to move. It is then kept moving during a portion of the idle period by the energy stored in the dancer roll springs.

Question Of Balance

It is necessary to have a proper balance between the amount of web feed and the speed of movement (as controlled by the machine cycle) as against the web roll weight, and brake and the dancer spring action. If this is attained, the web roll will be kept in nearly constant motion. This represents the ideal situation.

However, a problem arises from the difference in weight between that of a full roll and that of a roll near core diameter. This difference usually is so great that to accomplish the desired action during the entire consumption of a web roll is nearly impossible with simple mechanical devices.

Even so, this particular design can be used for speeds as high as 120 cycles/min. But to do this requires manual adjustment of the brake as the web roll becomes smaller.

It is evident that the faster the operation with this type of control, the better the action. The action tends to be controlled entirely by the dancer roll as it stabilizes to a particular movement varying only slightly during the entire feed of the web roll. From an observation of both types of dancer roll motion it would seem that the spring type offers the best control, and will give a wide range of satisfactory operation.

However used, the dancer roll has been one of the key devices and probably the most important of all in the accomplishment of intermittent web feeding in packaging machinery. When properly used, it offers a simple effective way of compensating for the varying speeds between the web roll and the web feed. It requires no additional power as it derives its power from the web feed motion. When it is understood that the web roll cannot be moved at the same rate that the web can be moved without considerably more expensive and elaborate mechanisms, an appreciation and respect is felt for this mechanism and its development. *(End)*

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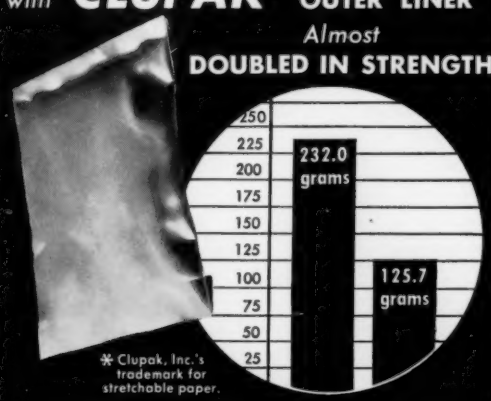

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Hillside, N. J.

What we think

Undisclosed intents about jobs slow down packaging progress

It is no secret that when some packaging experts go to work for their companies, they take care not to unveil all their accomplishments at once. It seems the astute ones hold back a few developments or spread their contributions over a period of time—as a sort of insurance policy against working themselves out of a job.

Unfortunately, some companies do hire a man, get him to empty his bag of know-how all at once, and then turn him out to pasture. We have no use for people who do this sort of thing deliberately. And however resourceful it may seem, the practice of an individual slowing down his own rate of contribution is not the answer.

The big trouble is that the problem is not as simple as it seems. More than just a matter of being either black or white, such difficulties usually involve shades of gray.

Unquestionably, some companies hire a man with every intention of keeping him indefinitely, then find out one day they have absorbed all that he has to offer. Perhaps the company misconceived its need in the first place. Maybe what it really wanted was a transitory, temporary consultant to accomplish specific aims rather than an expert hired on a continuing basis with expectation of a career. The real trouble may be in ascertaining the intent and need of the company.

Similarly, some individuals hope to join a company, produce a number of definite packaging attainments, then use these as a springboard to greater (or at least more alluring) opportunities elsewhere. Too, there are men who are troubleshooters and organization builders in the best sense of the word. They thrive on problem solving and the breaking of operational bottlenecks. By the time they have things running smoothly, the job has lost its luster and they look for greater challenge and new problems somewhere else.

Both parties must know what the job involves

Our main point is that the packaging man should search his own soul before taking a job so that he knows his own intentions and desires. Similarly, a company should know whether it wants a consultant or an employee. At the same time, there must be mutuality. The packaging man expecting long-time employment must be alert to the occasional brain-picker who would clean him out fast. Or he may have to help the company that sincerely thinks it wants to *hire* an expert, but actually needs a consultant. Likewise, the company must be alert to the man who professes a desire for a career, but actually contemplates moving out after he can create a brief, impressive burst of accomplishment.

We need not worry about the man who goes in as a consultant and later is invited to stay indefinitely. He is more than capable of discerning whether the suggested continuing need for him is real or apparent.

What we most need to develop is a climate of mutual respect and sincerity. Both parties must run their true colors up the mast. If one of them cannot figure out what his colors are (or should be) the other should help him do so.

Let's have no calculated holding back

Above all, we must avoid placing any artificial brakes on creativity or productivity. It is basically unsound for a man to *deliberately* hold back accomplishments which his company presumably needs. If he is *forced* to do this as the only realistic way of attaining job tenure, there is something wrong with the practices of the company trying to exploit him.

Much as we should like to be wrong on this point, we are afraid that the practice of picking a man's brains is more widespread than it should be. Obviously no one talks about this sort of thing and specific charges are extremely difficult to document.

Companies that persist in this sort of thing are doing themselves more harm than good. Today we not only have progress, but a faster *rate* of progress and technical development than ever before. Regardless of who is at fault, there is no place in the field of packaging for intellectual slow-downs or calculated withholding of developments. Those who practice it or create situations making it necessary are going to find themselves passed by while others who avoid these pitfalls move full speed ahead.

Bruce Hollingren

Editor

KIRSCH
PROBLEM: Machine package curtain rod hardware in a protective pouch complete with printed trade-mark identity and installation instructions.
SOLUTION: Thilco clear polethylene coated M. F. Kraft permits high speed machine sealing — provides protection from dirt, corrosion and loss of parts.

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PROBLEM: Package dry soup mix in sales appealing print labeled pouch with positive protection from moisture absorption.

SOLUTION: Thilco white M. G. Kraft is foil laminated one side and clear polyethylene coated on other side for required moisture barrier. Eye catching 4-color label decoration is Thilco flexo-printed on gleaming foil side.

PROBLEM: Protect plastic switch plates from dirt and moisture — identify product, and permit consumer selection without opening package.

SOLUTION: Thilco trade-mark decorated M. G. Kraft with scuff-proof, varnished overlay on one side and clear polyethylene coating on other provides protection and medium for heat sealing to "see-thru" cellophane that forms pouch.

PROBLEM: Provide a moisture barrier pouch packet to prevent "caking" of hygroscopic dye granules.

SOLUTION: Thilco polyethylene one side coated M. F. Kraft furnishes the ideal moisture barrier combination. Thilco flexo-printing provides the all-important trademark identification.

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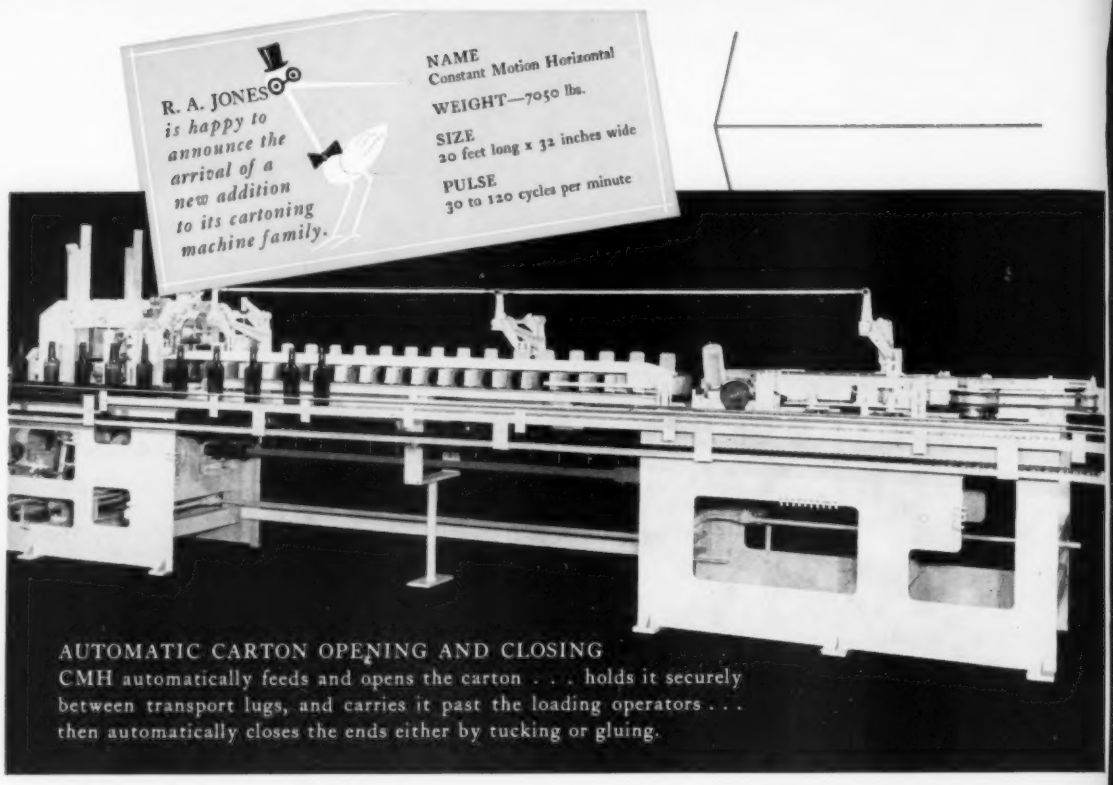

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